



Instructions for use

# BV Libra

Release 1.2



# BV Libra

## INSTRUCTIONS FOR USE

*Release 1.2*

**English**

## Instructions for Use

Philips Medical Systems Nederland B.V. reserves the right to make changes to both this Instructions for Use and to the product(s) it describes. Equipment specifications are subject to alteration without notice. Nothing contained within this Instructions for Use is intended as an offer, warranty, promise or contractual condition, and must not be taken as such. All changes will be in compliance with regulations governing manufacture of medical equipment.

Printed in the Netherlands.

Document number: 9896 001 92274

© Koninklijke Philips Electronics N.V. 2005

No part of this publication may be reproduced, transmitted, transcribed, stored in a retrieval system or translated into any human or computer language in any form by any means without the consent of the copyright holder.

Unauthorized copying of this publication may not only infringe copyright but also reduce the ability of Philips Medical Systems Nederland B.V. to provide accurate and up-to-date information to users and operators alike.

---

# Contents

---

<b>1</b>	<b>Introduction .....</b>	<b>1-1</b>
1.1	About the BV Libra .....	1-1
1.2	About this manual .....	1-1
1.2.1	<i>Conventions</i> .....	1-2
1.3	Intended use .....	1-2
1.4	Contra-indications .....	1-3
1.5	Compatibility .....	1-4
1.6	Compliance .....	1-4
1.7	Training .....	1-5
1.8	Other manuals .....	1-5
<b>2</b>	<b>Safety .....</b>	<b>2-1</b>
2.1	Important safety directions .....	2-1
2.2	Emergency procedures .....	2-2
2.3	Electrical safety .....	2-3
2.4	Transportation safety .....	2-3
2.5	Mechanical safety .....	2-4
2.6	Explosion safety .....	2-4
2.7	Fire safety .....	2-4
2.8	Mobile telephones & similar products .....	2-5
2.9	Electromagnetic compatibility .....	2-5
2.10	Radiation safety .....	2-6
2.11	Laser light radiation safety .....	2-7
2.12	Labels and symbols .....	2-8
2.12.1	<i>Labels</i> .....	2-8
2.12.2	<i>Symbols</i> .....	2-10
<b>3</b>	<b>User customization .....</b>	<b>3-1</b>
3.1	Acknowledgement and terms .....	3-1
3.2	Set-up page .....	3-2
3.3	Customizing .....	3-5
<b>4</b>	<b>System overview .....</b>	<b>4-1</b>
4.1	About the BV Libra system .....	4-1
4.2	Configuration .....	4-1
4.2.1	<i>The C-arm stand</i> .....	4-1
4.2.2	<i>The mobile viewing station</i> .....	4-6
4.2.3	<i>Mobile viewing station connector panel</i> .....	4-8
4.3	Options and accessories .....	4-9
4.3.1	<i>High-end monitors</i> .....	4-9
4.3.2	<i>Flat screen LCD monitors</i> .....	4-9
4.3.3	<i>Standard DICOM package</i> .....	4-9

4.3.4	<i>Advanced DICOM package</i> .....	4-10
4.3.5	<i>ViewForum Surgical Workstation</i> .....	4-10
4.3.6	<i>Password protection</i> .....	4-10
4.3.7	<i>Paper/transparency printer</i> .....	4-11
4.3.8	<i>Medical DVD Recorder (MDVDR)</i> .....	4-11
4.3.9	<i>Laser positioning devices</i> .....	4-12
4.3.10	<i>Memory extension</i> .....	4-13
4.3.11	<i>Vascular package</i> .....	4-13
4.3.12	<i>Processing</i> .....	4-13
4.3.13	<i>Extended processing</i> .....	4-13
4.3.14	<i>Spacer</i> .....	4-14
4.3.15	<i>Detachable cassette holder</i> .....	4-14
4.3.16	<i>Sterile covers</i> .....	4-15

<b>5</b>	<b>Operation</b> .....	5-1
5.0	Introduction .....	5-1
5.0.1	<i>Safety</i> .....	5-1
5.1	Transportation .....	5-2
5.2	C-arm brakes and movements .....	5-5
5.3	System On/Off .....	5-9
5.3.1	<i>Connecting the system</i> .....	5-9
5.3.2	<i>Switching the system on</i> .....	5-11
5.3.3	<i>Password protection</i> .....	5-12
5.3.4	<i>Switching the system off</i> .....	5-13
5.3.5	<i>Emergency off</i> .....	5-13
5.3.6	<i>Mains failure</i> .....	5-14
5.4	Using help and information .....	5-15
5.4.1	<i>Information on the C-arm stand</i> .....	5-15
5.4.2	<i>Help on the mobile viewing station</i> .....	5-15
5.5	Entering patient and examination data .....	5-17
5.5.1	<i>Selecting a patient for acquisition</i> .....	5-19
5.6	Imaging essentials .....	5-20
5.6.1	<i>Rotate image</i> .....	5-20
5.6.2	<i>Scan reverse</i> .....	5-20
5.6.3	<i>Image Intensifier size</i> .....	5-21
5.6.4	<i>Contrast and Brightness</i> .....	5-21
5.6.5	<i>Noise reduction</i> .....	5-21
5.6.6	<i>Iris and shutter adjustments during fluoroscopy</i> .....	5-22
5.6.7	<i>Iris and shutter adjustments on Last Image Hold (LIH)</i> ....	5-23
5.6.8	<i>Automatic shutter positioning</i> .....	5-24
5.7	Monitor settings .....	5-25
5.7.1	<i>Flat screen LCD monitors</i> .....	5-26
5.8	X-ray control .....	5-27
5.8.1	<i>Automatic kV/mA control</i> .....	5-27
5.8.2	<i>Manual kV/mA control</i> .....	5-27
5.8.3	<i>Automatic mA increase in LDF mode</i> .....	5-27
5.8.4	<i>Skin dose management</i> .....	5-28
5.9	Making a Low Dose Fluoroscopy (LDF) image .....	5-29
5.10	Making a High Definition Fluoroscopy (HDF) image .....	5-30

5.11	Making vascular images .....	5-31
5.11.1	<i>Performing subtraction</i> .....	5-31
5.11.2	<i>Remasking</i> .....	5-32
5.12	Fluoroscopy modes .....	5-33
5.12.1	<i>Continuous fluoroscopy</i> .....	5-33
5.12.2	<i>Real pulsed fluoroscopy</i> .....	5-33
5.12.3	<i>Intermittent fluoroscopy</i> .....	5-33
5.13	Performing radiography .....	5-34
5.14	Image review .....	5-35
5.14.1	<i>Select an examination for review</i> .....	5-35
5.14.2	<i>Overview page</i> .....	5-35
5.14.3	<i>Single image review</i> .....	5-36
5.14.4	<i>Run cycle review</i> .....	5-36
5.14.5	<i>Dose report</i> .....	5-37
5.14.6	<i>Reviewing other examinations during acquisition</i> .....	5-38
5.14.7	<i>Delete a complete examination</i> .....	5-38
5.15	Protection and image storage management .....	5-39
5.15.1	<i>Protecting an image</i> .....	5-39
5.15.2	<i>Parking/protecting an image to the reference monitor</i> .....	5-40
5.16	Printing and recording (optional) .....	5-41
5.16.1	<i>Printing images on paper or transparency film</i> .....	5-41
5.16.2	<i>Recording images on DVD</i> .....	5-42
5.17	Standard DICOM package .....	5-49
5.17.1	<i>Selecting DICOM export tasks</i> .....	5-49
5.17.2	<i>Online transfer tasks</i> .....	5-51
5.17.3	<i>Working offline</i> .....	5-52
5.18	Advanced DICOM package .....	5-53
5.18.1	<i>Querying the Worklist management server</i> .....	5-53
5.18.2	<i>Sending MPPS data with examinations</i> .....	5-56
5.18.3	<i>Viewing Storage commit status of images</i> .....	5-57
5.19	ViewForum surgical workstation .....	5-58
5.19.1	<i>Switching on the ViewForum surgical workstation</i> .....	5-58
5.19.2	<i>Logging on to the ViewForum surgical workstation</i> .....	5-60
5.19.3	<i>Logging off the ViewForum surgical workstation</i> .....	5-61
5.19.4	<i>Switching off the ViewForum surgical workstation</i> .....	5-61
5.19.5	<i>Exporting data to and from the ViewForum surgical workstation</i> .....	5-62
5.19.6	<i>Exporting images to USB or DVD</i> .....	5-64
5.19.7	<i>Quick-start guide</i> .....	5-65
5.20	Post-processing images .....	5-68
5.20.1	<i>Contrast, Brightness and Edge enhancement (optional)</i> .....	5-69
5.20.2	<i>Override manual adjustments (optional)</i> .....	5-69
5.20.3	<i>Annotation (optional)</i> .....	5-70
5.20.4	<i>Zoom (optional)</i> .....	5-71
5.20.5	<i>Measure (optional)</i> .....	5-72
5.20.6	<i>Electronic shuttering (optional)</i> .....	5-76
5.20.7	<i>Add text for hardcopy (activated by default)</i> .....	5-77
5.20.8	<i>Invert image</i> .....	5-77
5.21	Options and accessories .....	5-78
5.21.1	<i>Laser positioning tools</i> .....	5-78

5.21.2	<i>Fitting sterile covers</i> .....	5-80
5.21.3	<i>Installing the cassette holder</i> .....	5-82
5.21.4	<i>Spacer for minimum Source-Skin distance</i> .....	5-82
5.21.5	<i>Optional equipment</i> .....	5-83
<b>6</b>	<b>System and error messages</b> .....	<b>6-1</b>
6.1	The C-arm stand .....	6-1
6.2	The mobile viewing station .....	6-1
6.3	The printer .....	6-1
6.4	MDVDR .....	6-1
6.5	ViewForum Surgical Workstation .....	6-2
<b>7</b>	<b>Maintenance</b> .....	<b>7-1</b>
7.0	Introduction .....	7-1
7.1	Planned maintenance programme .....	7-1
7.2	User routine checks programme .....	7-3
7.3	Cleaning and disinfection .....	7-6
7.3.1	<i>Cleaning</i> .....	7-6
7.3.2	<i>Disinfection</i> .....	7-6
7.3.3	<i>Paper/transparency printer head cleaning procedure</i> .....	7-7
<b>8</b>	<b>Product disposal</b> .....	<b>8-1</b>
8.0	Introduction .....	8-1
8.1	Passing the BV Libra on to another user .....	8-1
8.2	Final disposal of the BV Libra .....	8-2
<b>9</b>	<b>Technical data</b> .....	<b>9-1</b>
9.1	Standards and regulations .....	9-1
9.2	Specifications .....	9-1
9.2.1	<i>Environmental conditions</i> .....	9-1
9.2.2	<i>Generator</i> .....	9-2
9.2.3	<i>Maximum loading factors</i> .....	9-2
9.2.4	<i>Accuracy of display</i> .....	9-3
9.2.5	<i>Measurement basis for approval tests</i> .....	9-3
9.2.6	<i>X-ray tube</i> .....	9-3
9.2.7	<i>X-ray tube assembly</i> .....	9-5
9.2.8	<i>X-ray source assembly</i> .....	9-7
9.2.9	<i>Iris collimator</i> .....	9-7
9.2.10	<i>Lead shutters</i> .....	9-7
9.2.11	<i>Dose (rate)</i> .....	9-8
9.2.12	<i>Dose rate settings</i> .....	9-9
9.2.13	<i>Scattered radiation 6"</i> .....	9-9
9.2.14	<i>Scattered radiation 9"</i> .....	9-10
9.2.15	<i>Leakage radiation factor</i> .....	9-10
9.2.16	<i>X-ray tank surface temperature</i> .....	9-10
9.2.17	<i>Anode heat storage</i> .....	9-11
9.2.18	<i>Grid</i> .....	9-11
9.2.19	<i>Image intensifier</i> .....	9-11
9.2.20	<i>TV camera</i> .....	9-11

9.2.21	<i>Monitors</i> .....	9-11
9.2.22	<i>Digital processor</i> .....	9-12
9.2.23	<i>Video out</i> .....	9-13
9.2.24	<i>Data for laser copier programme</i> .....	9-13
9.2.25	<i>Power supply</i> .....	9-13
9.2.26	<i>Options and accessories</i> .....	9-15
9.2.27	<i>C-arm stand dimensions</i> .....	9-17
9.2.28	<i>Mobile viewing station dimensions</i> .....	9-21
9.2.29	<i>Certifiable items (USA only)</i> .....	9-22

<b>10</b>	<b>Appendices</b> .....	<b>10-1</b>
10.1	Special characters .....	10-1
10.2	Menu and function selection tree .....	10-2
10.3	Quantitative data .....	10-3
10.4	Scattered radiation (Isokerma data) .....	10-4
10.4.1	<i>Measurement conditions</i> .....	10-4
10.4.2	<i>Isokerma maps for BV Libra 6 inch II</i> .....	10-6
10.4.3	<i>Isokerma maps for BV Libra 9 inch II</i> .....	10-7
<b>11</b>	<b>Glossary</b> .....	<b>11-1</b>
11.1	Abbreviations .....	11-1
11.2	Definitions and terms .....	11-3
11.3	Legend .....	11-7
<b>12</b>	<b>Index</b> .....	<b>I-1</b>



---

# List of Figures

---

<b>1</b>	<b>Introduction</b>	
1.1	The system overview.....	1-1
<b>2</b>	<b>Safety</b>	
2.1	Location of safety labels.....	2-8
<b>3</b>	<b>User customization</b>	
3.1	Items on the 'Patient administration' page.....	3-1
3.2	Patient administration screen.....	3-2
3.3	Set-up page.....	3-3
<b>4</b>	<b>System overview</b>	
4.1	System components.....	4-1
4.2	Hand switch (left) and foot switch (right).....	4-2
4.3	C-arm rotation (left) and angulation (right) .....	4-3
4.4	C-arm vertical (left) and longitudinal (right) movement.....	4-3
4.5	C-arm panning (left) and parallel (right) movement.....	4-3
4.6	Screen layout of the C-arm stand display.....	4-4
4.7	C-arm stand connector panel.....	4-5
4.8	Layout of the Acquisition ready screen .....	4-7
4.9	Mobile viewing station connector panel .....	4-8
4.10	Printer.....	4-11
4.11	Medical DVD Recorder .....	4-11
4.12	Laser alignment tool.....	4-12
4.13	Laser aiming device .....	4-13
4.14	Spacer.....	4-14
4.15	Cassette holder .....	4-14
4.16	Sterile covers.....	4-15
<b>5</b>	<b>Operation</b>	
5.1	C-arm stand brake, transport and steering handle.....	5-3
5.2	'A' Wheel directional lock position.....	5-4
5.3	'B' Brake released.....	5-4
5.4	'C' Brake applied.....	5-4
5.5	The rotation brake handle .....	5-5
5.6	The rotation safety stop .....	5-6
5.7	The angulation brake handle .....	5-6
5.8	The longitudinal brake handle.....	5-7
5.9	The panning (scan) brake .....	5-7
5.10	C-arm stand connector panel.....	5-9
5.11	Equipotential earth connection.....	5-10
5.12	Start-up screens: mobile viewing station and C-arm stand.....	5-11
5.13	Password panel .....	5-12
5.14	The help panel .....	5-16
5.15	Patient administration screen.....	5-17
5.16	Rotation with LIH .....	5-20
5.17	Iris and shutters adjustment on LIH.....	5-23
5.18	Flat screen LCD monitors .....	5-26

5.19	LCD monitor assembly lock: locked and unlocked.....	5-26
5.20	The overview page with indicators.....	5-36
5.21	Dose report screen.....	5-37
5.22	Overview of image storage management.....	5-39
5.23	Paper and transparency printer.....	5-41
5.24	Medical DVD Recorder (MDVDR) .....	5-42
5.25	Replay speed selection .....	5-46
5.26	Using the MDVDR buttons to navigate the Setup menu .....	5-47
5.27	Export panel.....	5-49
5.28	Transfer panel .....	5-51
5.29	Modality worklist review panel.....	5-53
5.30	Performed Procedure Step panel.....	5-56
5.31	ViewForum surgical workstation .....	5-58
5.32	Monitor switch key sequence sticker.....	5-59
5.33	ViewForum surgical workstation keyboard and mouse .....	5-59
5.34	ViewForum surgical workstation log on screen.....	5-60
5.35	Export and import scenarios.....	5-62
5.36	Post-processing functions .....	5-68
5.37	Contrast, brightness and edge enhancement control panel.....	5-69
5.38	Annotation.....	5-70
5.39	Zoom .....	5-71
5.40	Measurement calibration .....	5-72
5.41	Measurement of two points .....	5-73
5.42	Measurement of three points and the angle .....	5-74
5.43	Measurement of two distances and the angle .....	5-75
5.44	Electronic shuttering .....	5-76
5.45	Adjusting the laser aiming device.....	5-79
5.46	Sterile cloth covers.....	5-80
5.47	Installing the sterile cover on the spring bow .....	5-80
5.48	Disposable sterile covers .....	5-81
5.49	Cassette holder with inserted cassette.....	5-82

## **7 Maintenance**

7.1	Laser aiming device check with scissor point .....	7-4
-----	--	-----

## **9 Technical data**

9.1	Single load rating small focus, 150 W eq. anode input power.....	9-4
9.2	Single load rating large focus, 150 W eq. anode input power.....	9-4
9.3	Anode heating and cooling curves .....	9-5
9.4	X-ray tube Emission chart small focus, voltage DC .....	9-5
9.5	X-ray tube emission chart large focus, voltage DC.....	9-6
9.6	X-ray tank emission chart small focus.....	9-6
9.7	X-ray tank emission chart large focus.....	9-6
9.8	Heating and cooling curves .....	9-7
9.9	BV Libra 6" front view .....	9-18
9.10	BV Libra 6" side view.....	9-18
9.11	BV Libra 6" top view.....	9-19
9.12	BV Libra 9" front view .....	9-19
9.13	BV Libra 9" side view.....	9-20
9.14	BV Libra 9" top view.....	9-20
9.15	BV Libra side and front view.....	9-21

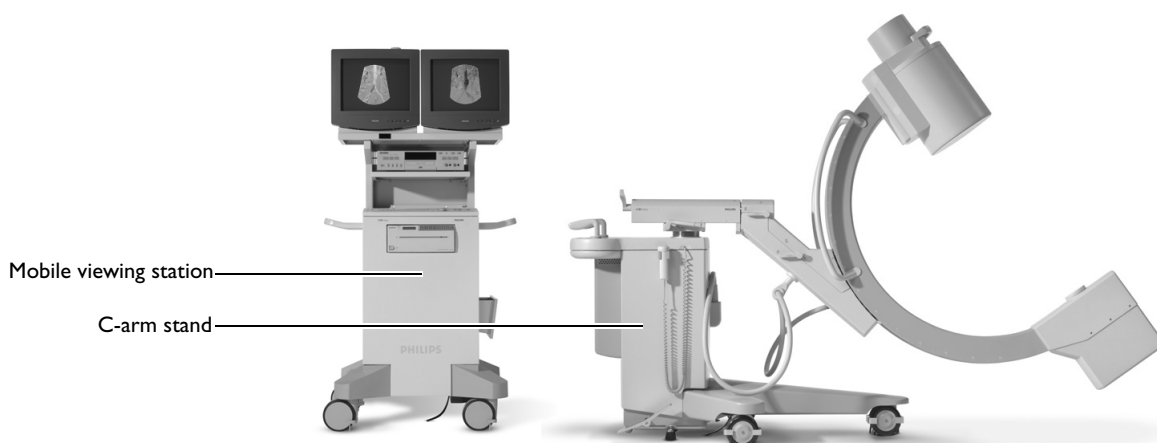
10.1	Isokerma map measurement configuration (horizontal) .....	10-5
10.2	Isokerma map measurement configuration (lateral) .....	10-5
10.3	6 inch II Isokerma map (horizontal) .....	10-6
10.4	6 inch II Isokerma map (lateral) .....	10-6
10.5	9 inch II Isokerma map (horizontal) .....	10-7
10.6	9 inch II Isokerma map (lateral) .....	10-7



# 1 Introduction

## 1.1 About the BV Libra

The BV Libra is a mobile diagnostic X-ray image acquisition and viewing system. It is designed for medical use in surgical theatres.



**Figure 1.1** The system overview

## 1.2 About this manual

This manual is intended to assist users and operators in the safe and effective operation of the equipment described. The ‘user’ is considered to be the body with authority over the equipment; ‘operators’ are those persons who actually handle the equipment.

Before attempting to operate the equipment, you must read, note and strictly observe all **DANGER** notices and **SAFETY** markings on the BV Libra.

Before attempting to operate the equipment, you must read this manual thoroughly, paying particular attention to all **WARNINGS**, **CAUTIONS** and **NOTES** incorporated in it. You must pay special attention to all the information given and procedures described in Section 2, ‘Safety’.



### **WARNINGS**

*are directions which if not followed could cause fatal or serious injury to an operator, patient or any other person, or could lead to a misdiagnosis.*

### **CAUTIONS**

*are directions which if not followed could cause damage to the equipment described in this manual and/or any other equipment or goods, and/or cause environmental pollution.*

### **NOTES**

*are intended to highlight unusual points as an aid to an operator.*

Within this manual, the most extensive configuration of the system is described, with the maximum number of options and accessories. Not every function described may be available on your system.

This manual was originally drafted, approved and supplied by Philips Medical Systems in the English language under the product part code 9896 001 92274.

### 1.2.1 Conventions

Throughout this Instructions for use, certain typographical conventions have been used in order to clarify instructions. These should be interpreted as follows:

#### Vertical line symbols

The vertical line symbols ‘|’ are used to indicate the name of a (screen) button or a (console) (soft-)key.

#### EXAMPLE

- Press the |Acc| key.

#### Single quotes

Single quotes are used to indicate the following:

- section titles of this Instructions for Use
- names of screens, pages, panels, fields and buttons on the monitor or display.

#### EXAMPLE

- Enter the patient name in the ‘Name’ field.

## 1.3 Intended use

The Philips BV Libra is intended to be installed, used and operated only in accordance with the safety procedures and operating instructions given in this manual for the purposes for which it was designed. The purposes for which the equipment is intended are given below. However, nothing stated in this manual reduces users' and operators' responsibilities for sound clinical judgement and best clinical procedure.

The Philips BV Libra is intended for:

#### Orthopaedic surgery

- hip nailing, femur nailing, tibia fractures, humerus fractures, pelvis, small objects (wrist etc.)
- spine fixation.

#### Neuro surgery

- pain treatment
- hypophysectomy
- laser nucleolysis
- vertebroplasty.

**Abdominal surgery**

- cholangiography
- urology (percutaneous lithotripsy, urethroscopy, cystoscopy).

**Thoracic surgery**

- pacemaker connections
- interventions.

**Vascular procedures**

- peripheral, abdominal and cerebral vascular procedures
- vascular interventions, such as abdominal aortic aneurism.

**WARNING**

***Interventional Procedures: this equipment is intended for the performance of prolonged Radioscopically guided interventional procedures including those in which there is a risk of skin dose levels being high enough to cause deterministic effects.***

Installation, use and operation of this equipment is subject to the law in the jurisdiction(s) in which the equipment is being used. Both users and operators must only use and operate the equipment in such ways as do not conflict with applicable laws, or regulations which have the force of law.

Uses of the equipment for purposes other than those intended and expressly stated by the manufacturer, as well as incorrect use or operation, may relieve the manufacturer (or his agent) from all or some responsibility for resultant non-compliance, damage or injury.

**CAUTION**

***In the United States, Federal law restricts this device to sale, distribution, and use by or on the order of a physician.***

## 1.4 Contra-indications

X-rays are potentially hazardous. Special precautions must be taken and/or caution must be exercised in the following cases:

- special consideration must be given to the protection of the embryo or fetus during radiological examination or treatment of women known to be pregnant
- sensitive body organs (e.g., lens of eye, gonads) must be shielded whenever they are likely to be exposed to the working beam
- acute skin burns (patients)
- acute hair loss (patients)
- chronic radiation injury (staff).

## 1.5 Compatibility

Equipment described in this manual should not be used in combination with other equipment or components unless such other equipment or components are expressly recognized as compatible by Philips Medical Systems. A list of such equipment and components is available on request from the contact address given under the following heading Compliance.

Changes and/or additions to the equipment should only be carried out by Philips Medical Systems or by third parties expressly authorized by Philips Medical Systems to do so. Such changes and/or additions must comply with all applicable laws and regulations that have the force of law within the jurisdiction(s) concerned, and with best engineering practice.

Changes and/or additions to the equipment that are carried out by persons without the appropriate training and/or using unapproved spare parts may lead to the PMS warranty being voided. As with all complex technical equipment, maintenance by persons not appropriately qualified and/or using unapproved spare parts carries serious risks of damage to the equipment and of personal injury.

## 1.6 Compliance

The Philips BV Libra complies with relevant international and national standards and laws. Information on compliance is supplied on request by your local Philips Medical Systems representative, or by:

Philips Medical Systems  
GXR Business Team Surgery  
P.O. Box 10 000  
5680 DA BEST  
The Netherlands

Facsimile: +31 40 2763110

The Philips BV Libra complies with relevant international and national law and standards on EMC (electro-magnetic compatibility) for this type of equipment when used as intended. Such laws and standards define both the permissible electromagnetic emission levels from equipment and its required immunity to electromagnetic interference from external sources.

The BV Libra conforms to IEC 60601-1 and is classified as class 1, type B.

## 1.7 Training

Operators of the Philips BV Libra must have received adequate training on its safe and effective use before attempting to operate the equipment described in this manual. Training requirements for this type of device will vary from country to country. It is for users to make sure that operators receive adequate training in accordance with local laws or regulations which have the force of law.

If you require further information about training in the use of this equipment, please contact your local Philips Medical Systems representative. Alternatively, contact:

Philips Medical Systems  
GXR Business Team Surgery  
P.O. Box 10 000  
5680 DA BEST  
The Netherlands

Facsimile: +31 40 2763110

## 1.8 Other manuals

This manual describes the BV Libra. However, certain other pieces of equipment may be used with the system and these units will be supplied with their own manuals.



## 2 Safety

### 2.1 Important safety directions

Philips Medical Systems products are all designed to meet stringent safety standards. However, all medical electrical equipment requires proper operation and maintenance, particularly with regard to human safety.

It is vital that you read, note, and where applicable strictly observe all **DANGER** notices and safety markings on the BV Libra.

It is vital that you follow strictly all safety directions under the heading **SAFETY** and all **WARNINGS** and **CAUTIONS** throughout this manual, to help ensure the safety of both patients and operators.

In particular, you must read, understand and know the Emergency procedures described in this **SAFETY** section before attempting to use the equipment for any patient examination.

You should also note the following information given in the Introduction section of this manual:

- 1.3 Intended use
- 1.4 Contra-indications
- 1.7 Training.



#### WARNINGS

##### Maintenance & Faults

- **Do not use the BV Libra for any application until you are sure that the User Routine Checks Programme has been satisfactorily completed, and that the Planned Maintenance Programme is up-to-date.**
- **If any part of the equipment or system is known (or suspected) to be defective or wrongly-adjusted, DO NOT USE the system until a repair has been made. Operation of the equipment or system with defective or wrongly-adjusted components could expose the operator or the patient to radiation or other safety hazards. This could lead to fatal or other serious personal injury, or to clinical misdiagnosis/mistreatment.**

You can find information about the User Routine Checks Programme and the Planned Maintenance Programme in Section 7, 'Maintenance'.

##### Safety awareness

- **Do not use the BV Libra for any application until you have read and understood and know all the safety information, safety procedures and emergency procedures contained in this Safety section. Operation of the BV Libra without proper awareness of how to use it safely could lead to fatal or other serious personal injury. It could also lead to clinical misdiagnosis/mistreatment.**

**Adequate training**

- **Do not use the BV Libra for any application until you have received adequate and proper training in its safe and effective operation. If you are unsure of your ability to operate this equipment safely and effectively DO NOT USE IT. Operation of this equipment without proper and adequate training could lead to fatal or other serious personal injury. It could also lead to clinical misdiagnosis/mistreatment.**

For information about training, please refer to Section 1.7, 'Training' in this manual.

**Safety devices**

- **Never attempt to remove, modify, override or frustrate any safety device on the equipment. Interfering with safety devices could lead to fatal or other serious personal injury.**

**Intended use & compatibility**

- **Do not use the BV Libra for any purpose other than those for which it is intended.**
- **Do not use the BV Libra with any products other than those which Philips Medical Systems recognizes as compatible.**
- **Operation of the BV Libra for unintended purposes, or with incompatible equipment, could lead to fatal or other serious injury. It could also lead to clinical misdiagnosis/mistreatment.**

For more information, please refer to Section 1.3, 'Intended use' and 1.5, 'Compatibility' of this manual.

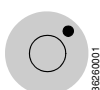
## 2.2 Emergency procedures

In case of a general emergency caused by the BV Libra, it is recommended to switch the system off, firstly:

- by removing the mains power plug from the socket outlet.

Alternatively:

- by pressing the red [System off] key [C] on the mobile viewing station or the red [C-arm stand off] key [B] on the C-arm stand.

**WARNING**

**When the BV Libra is switched off using the [System off] key [C] on the mobile viewing station or the [C-arm stand off] key [B] on the C-arm stand, be aware that mains power is still applied to some circuits in the system until the mains power plug is removed from the socket outlet.**

## 2.3 Electrical safety



### WARNINGS

- *Do not remove covers or cables from this equipment, unless expressly instructed to do so in this manual. High electrical voltages are present within this equipment. Removing covers or cables could lead to serious or fatal personal injury.*
- *Do not touch the pins of the stand/mobile viewing station cable or the central pin of the video out connector when touching the patient.*
- *Covers or cables should only be removed by the qualified and authorized service personnel. In this context, qualified means ‘those legally permitted to work on this type of medical electrical equipment in the jurisdiction(s) where the equipment is being used’, and authorized means ‘those authorized by the user of the equipment’.*
- *Only use this equipment in rooms or areas that comply with all applicable laws (or regulations having the force of law) concerning electrical safety for this type of equipment.*
- *Always electrically isolate this equipment from the mains electrical supply before cleaning, disinfecting or sterilizing it.*

### Equipotential ground connection



### WARNINGS

- *This equipment may only be used in areas meeting local standards for electrical safety in rooms used for medical purposes, for example the US National Electrical Code. IEC 60601 also gives guidance about an equipotential ground (earth) connection point.*
- *An equipotential ground (earth) connection point and a connection cable are provided.*

### Additional equipotential ground connection

- *An additional equipotential ground (earth) connection point is provided, since the equipment is transportable and the reliability of the main equipotential ground connection point might be insufficient.*

## 2.4 Transportation safety

When moving mobile or transportable devices take care to avoid colliding with/or overrunning objects and/or persons. The user must be familiar with the brake system and all controls for steering before moving the equipment.



### WARNING

- *Ensure that the system is in the transport position (see also section 2.12.1 ‘Labels’)*
- *Cross ramps, thresholds and obstacles as slowly as possible. Take extra care on steep slopes.*
- *Wheel brakes must always be applied when the device is stationary.*

## 2.5 Mechanical safety



### WARNING

*Covers should only be removed by qualified and authorized service personnel. In this context, qualified means 'those legally permitted to work on this type of medical electrical equipment in the jurisdiction(s) in which the equipment is being used', and authorized means 'those authorized by the user of the equipment'. Ordinary users should NEVER remove the covers themselves.*

## 2.6 Explosion safety

This equipment must not be used in the presence of explosive gases or vapours, such as certain anaesthetic gases. Use of electrical equipment in an environment for which it was not designed can lead to fire or explosion.



### WARNING

*Flammable or potentially explosive disinfecting sprays must not be used, since the resulting vapour could ignite, causing fatal or other serious personal injury and/or damage to equipment.*

## 2.7 Fire safety

Use of electrical equipment in an environment for which it was not designed can lead to fire or explosion. Fire regulations for the type of medical area being used should be fully applied, observed and enforced. Fire extinguishers should be provided for both electrical and non-electrical fires.

All operators of this medical electrical equipment should be fully aware of and trained in the use of fire extinguishers and other fire-fighting equipment, and in local fire procedures.



### WARNING

*Only use extinguishers on electrical or chemical fires which are specifically labelled for those purposes. Using water or other liquids on an electrical fire can lead to fatal or other serious personal injury.*

If it is safe to do so, attempt to isolate the equipment from electrical and other supplies before attempting to fight a fire. This will reduce the risk of electric shocks.

## 2.8 Mobile telephones & similar products

The Philips BV Libra complies with the requirements of applicable EMC standards.

Other electronic equipment exceeding the limits defined in such EMC standards, such as certain mobile telephones, could, under unusual circumstances, affect the operation of the BV Libra.



### WARNING

***You should not allow any portable radio transmitting devices (such as mobile telephones) into the examination room - whether the device is switched on or off. Such devices could exceed EMC radiation standards and, under unusual conditions, interfere with the proper functioning of the BV Libra. This could, in extreme cases, lead to fatal or other serious personal injury or to clinical mistreatment.***

## 2.9 Electromagnetic compatibility

The BV Libra is designed and tested to withstand electrostatic discharges (ESD). However due to the nature of some electronic circuits, some pins in the external connectors are sensitive for ESD.

### CAUTIONS

- ***Pins of connectors identified with the ESD warning symbol should not be touched.***
- ***The use of accessories and cables other than those specified, may result in increased emission or decreased immunity levels. See also the tables of electromagnetic emissions and immunity in the Technical Data of the Service documentation.***

The BV Libra should not be used adjacent to or stacked with other equipment and that if adjacent or stacked use is necessary, its normal operation should be verified

The BV Libra needs special precautions regarding Electromagnetic compatibility (EMC) and needs to be installed and put into service according to EMC information provided in the Service documentation.

## 2.10 Radiation safety

Only qualified and authorized personnel may operate this equipment. In this context, qualified means ‘those legally permitted to operate this type of medical electrical equipment in the jurisdiction(s) in which the equipment is being used’, and authorized means ‘those authorized by the user of the equipment’.

Personnel operating the equipment and personnel within the examination room must observe all laws and regulations which have the force of law within the jurisdiction(s) concerned. If there is any doubt about these laws and regulations, do not use it.

In addition, users are strongly urged to acquaint themselves with the current recommendations of the International Commission on Radiological Protection, and in the United States, with those of the US National Council for Radiological Protection.

- ICRP, Pergamon Press, Oxford, New York, Beijing, Frankfurt, São Paulo, Sydney, Tokyo, Toronto
- NCRP, Suite 800, 7910 Woodmont Avenue, Bethesda, Maryland 20814, USA.

Full use must be made of all radiation protection features on the equipment, and of all radiation protection devices, accessories, systems and procedures available to you as the operator.



### WARNINGS

- ***NEVER attempt to remove, modify, override or frustrate any safety device on the equipment. Interfering with safety devices could lead to fatal or other serious personal injury.***
- ***Make sure that, when the BV Libra is not used, the system lock is in the disabled position and the system lock key is removed to prevent accidental radiation.***
- ***During radiography with 6" systems, the diameter of the X-ray field may exceed the edges of the primary protective shielding (the image intensifier container). The user must ensure that a cassette holder is fitted before making an exposure. (For HHS systems the radiography mode is disabled.)***
- ***The II LAT and the tank LAT plate should be removed when not in use.***

Use only the prescribed dose necessary to perform a particular examination or treatment.



### WARNING

***Interventional Procedures: this equipment is intended for procedures in which skin dose levels can be high enough in normal use to cause a risk of deterministic effects. It is vital that you strictly follow all safety directions for this type of procedure.***

**Radiation guidelines**

When performing radiation, the following rules should be followed:

- do not radiate when not necessary
- radiate for as short a time as possible
- use automatic dose rate control whenever possible
- stay as far away as possible from the radiated object/X-ray source
- wear aprons and other protective clothing as appropriate
- use badges to monitor the radiation levels received
- use LDF as much as possible in place of HDF to reduce dose
- collimate as much as possible using the pre-indicators (on the LIH image)
- focal spot to skin (object) distance should be kept as large as possible to reduce the absorbed dose
- remove all supplementary obscuring objects from primary beam (this includes the hands of the user)
- place, when possible, the X-ray source under table to reduce scattered radiation resulting in extra safety for physician and staff
- take into account any adverse effects that may arise due to materials located in the X-ray beam, for example, the operating table
- the mobile viewing station should be positioned so that the radiation indicator on the mobile viewing station is visible to all persons at all positions in the room.

**Skin dose management**

During prolonged interventional procedures skin dose levels can be high enough in normal use to cause a risk of deterministic effects.

Risk management should be used to determine the risks and benefits for any given procedure.

This system has several different selectable X-ray modes each producing different image quality by using different dose rates. The best X-ray mode for the procedure should be used.

## 2.11 Laser light radiation safety

The laser light in the Laser Alignment Tool (LAT) should only be used under supervision of a medically trained person with knowledge of the hazards implied by the use of laser light.

It is the user's responsibility to fulfil the local safety regulations regarding laser light radiation.

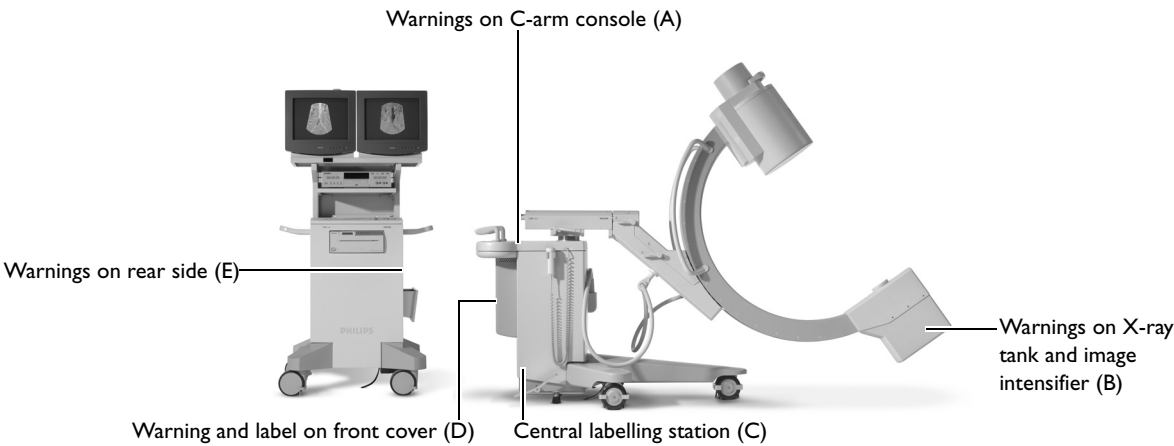
**WARNINGS**

- ***Class II (FDA) / Class 3A (IEC) laser, do not stare into the beam.***
- ***The laser must not be switched on without purpose, and unnecessary exposure must be avoided.***
- ***Use of controls, adjustments or procedures other than those specified in this Instructions for use may result in hazardous radiation exposure.***

## 2.12      Labels and symbols

### 2.12.1      Labels

The BV Libra has the following safety labels which are located as shown below.

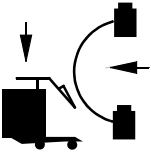


**Figure 2.1**      Location of safety labels

#### Warnings on the C-arm stand console (A)

The following warnings are on the C-arm stand console.

Transport position  
Position de placement

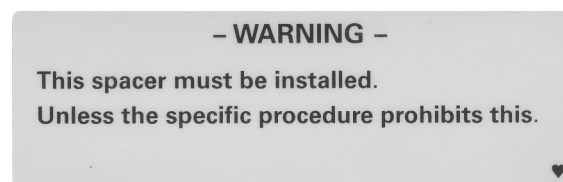
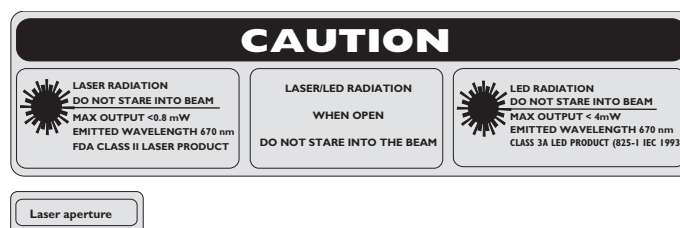


**WARNING:**  
This X-ray unit may be dangerous to patient and operator unless safe exposure factors and operating instructions are observed

36260017

### Warnings on the X-ray tank and image intensifier (B)

The following warnings are on the X-ray tank and image intensifier.



### Central labelling station (C)

The central labelling station contains the following information about the certifiable items (DHHS):

- X-ray control
- X-ray control (XTV)
- tube housing assembly
- image intensifier
- X-ray generator
- beam limiting device
- laser product
- X-ray tube.

And the complete system configuration.

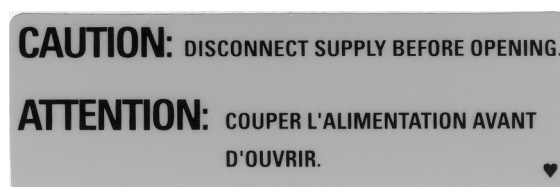


#### WARNING

*The appropriate labels on this panel must be updated when replacing certified components.*

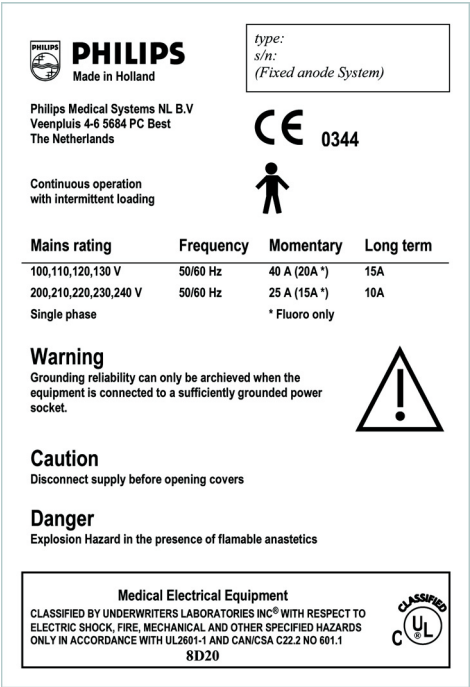
### Warning and label on the front cover of the C-arm stand (D)

The following warning and label are on the front cover of the C-arm stand.



Warnings and labels on the rear side of the mobile viewing station (E)

The following warnings and labels are on the rear side of the mobile viewing station.



2.12.2

Symbols

The BV Libra has the following symbols.



**Type B**  
This symbol indicates that the equipment is, according to the degree of protection against electric shock, classified as Type B (IEC60601-1).



**Danger voltage**  
Dangerous voltages are present within the cabinet marked with this symbol. Only trained personnel may remove the cover, or otherwise obtain access to system components. There are no user serviceable parts and never attempt to repair this unit.



**Attention**  
This symbol indicates that accompanying documents must be consulted. A similar symbol is used to indicate warning text which should be given special attention in both the Instructions for use and the Service manual.



**Information**  
This symbol indicates information.



**ESD warning symbol**  
Connections to sensitive parts are identified by this ESD warning symbol.



**CE**  
This symbol indicates that the equipment complies with the European Communities regulation, the number of the notified body is printed.



### **Equipotential earth**

This symbol indicates the Equipotential earth connector. This connector allows a connection between the C-arm stand and the patient support table or the earth (ground) bus bar provided by the hospital.



### **Underwriters Laboratories Classified**

This symbol indicates that the BV Libra has been tested and certified by the Underwriters laboratories Inc. to comply with the applicable U.S. and Canadian Standards.



### **Small focal spot**

The value next to the symbol indicates the size of the small focal spot.



### **Large focal spot**

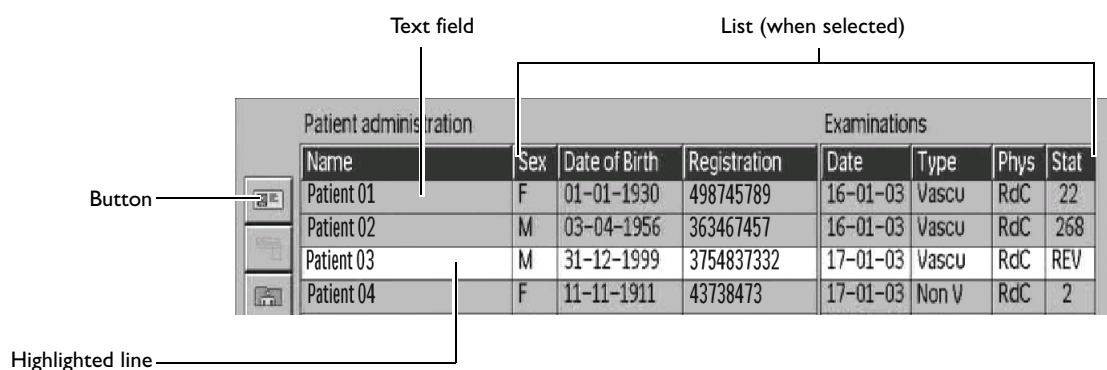
The value next to the symbol indicates the size of the large focal spot.



## 3 User customization

This Section describes how to use the mobile viewing station console and change the user-changeable system parameters. There is also a list of items which can be changed by the Service Organization.

### 3.1 Acknowledgement and terms



**Figure 3.1** Items on the 'Patient administration' page

Term	Comment
Line	A line represents a record. When selected the line is highlighted.
Button	A button initiates a certain function when it is clicked.
Field	A field contains information such as patient name, examination type etc. When a field is selected the text can be edited or a list is displayed.
List	If a field contains pre-defined data a list is displayed when the field is selected. The pointer disappears and the selected list-item is highlighted. Use the trackball to scroll through the list.

#### Navigation

To navigate on the screen, use the trackball [34] on the mobile viewing station console. A pointer indicates where you are.

#### Entering text

When a text field is selected, text can be entered using the keyboard. Special characters can be entered with key combinations. See Section 5.5, 'Entering patient and examination data' for more information.



Confirmation

To confirm an action on the mobile viewing station, such as selecting an object/line, entering data etc., press the |Acc| key [36] when the pointer is on the right position.

For example, if the text ‘Select one of the sliders’ appears, move the pointer to the slider and press the |Acc| key [36]. The text continues with ‘move it to the desired position and accept it’; use the trackball to position the slider and press the |Acc| key again.



Undo

To make a correction when entering data on the mobile viewing station, such as mistyping, use the backspace/delete key on the keyboard.



To undo an action on the mobile viewing station, e.g. during annotation, press the |Undo| key [35]. Pressing the key will return to the previous step. This can be repeated until all steps are undone.

3.2 Set-up page

The BV Libra has system parameters which can be changed by the operator. This is done on the ‘Set-up’ page which can be accessed via the ‘Patient administration’ page (the page displayed after the BV Libra is switched on).



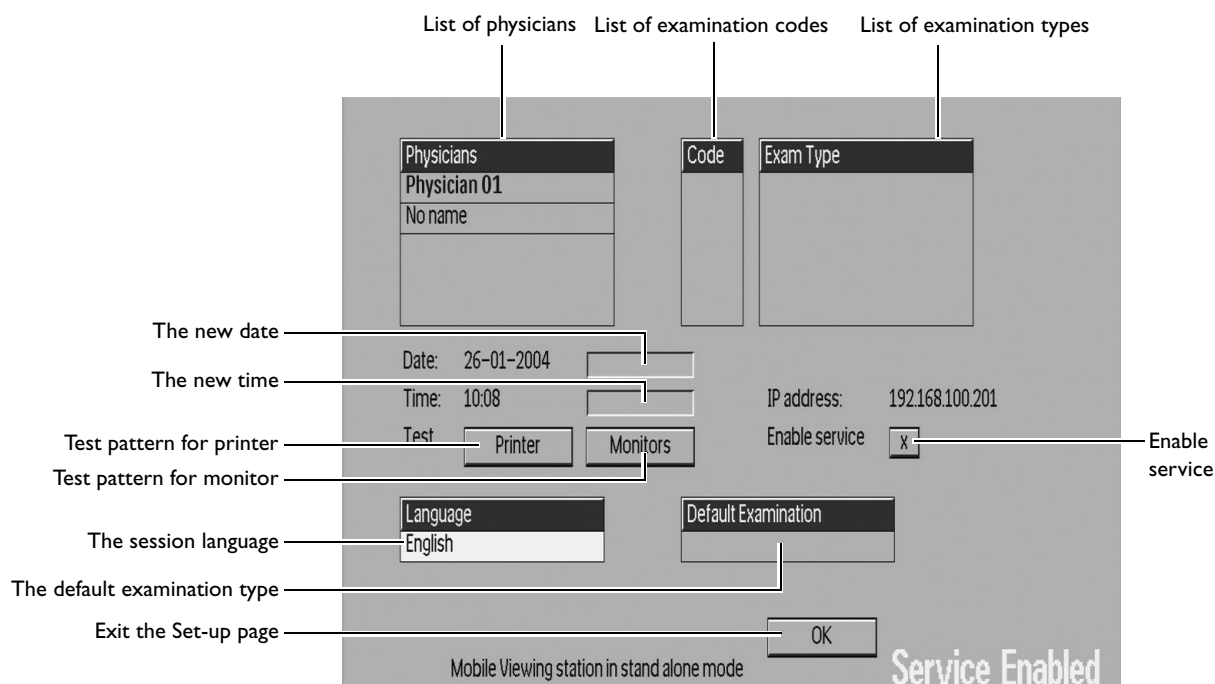
- 1 Press, when not in the ‘Patient administration’ screen, the |Patient administration| key [22].

Patient administration				Examinations			
Name	Sex	Date of Birth	Registration	Date	Type	Phys	Stat
Patient 01	F	01-01-1930	498745789	16-01-03	Vascu	RdC	22
Patient 02	M	03-04-1956	363467457	16-01-03	Vascu	RdC	268
Patient 03	M	13-12-1940	7547347	16-01-03	Non V	JWK	1
Patient 04	F	11-11-1911	43738473	17-01-03	Non V	RdC	2
No name	U			17-01-03	Non V		0
Patient 05	M	14-06-1944	6874365	17-01-03	Non V	DD	1
No name	U			17-01-03	Non V		0
Patient 06	M	31-12-1999	3754837332	17-01-03	Vascu	RdC	REV
No name	U			17-01-03	Non V		0
Patient 07	M	12-11-1980	628284		Non V	MH	SCH
Patient 08	F	23-06-1967	7236374		Vascu	JH	ACQ
No name	U				Non V		SCH

Figure 3.2 Patient administration screen



- 2 Using the trackball [34], move the pointer to the |Set-up| button and press the |Acc| key [36]. The ‘Set-up’ page is displayed.



**Figure 3.3** Set-up page

### Changing settings, general

- 1 Using the trackball [34], move the pointer to the line to be changed and press the |Acc| key [36].
- 2 In case of a text field, enter the text using the keyboard [21] on the mobile viewing station and accept it by pressing the |Acc| key [36].
- or -
- 2 In case of a list, scroll through the list using the trackball [34], make a choice and accept it by pressing the |Acc| key [36].
- 3 To exit the set-up page, move the pointer to the |OK| button and press the |Acc| key [36].

For a description of lines, fields and lists see Section 3.1, 'Acknowledgement and terms'.

**NOTE** *All changes made on the Set-up page take effect immediately.*

### Adding or updating a physician's name

- 1 Using the trackball [34], move the pointer to the 'No name' field and press the |Acc| key [36].  
When necessary scroll through the list by moving the pointer to the scroll arrows right of the 'Physicians' field and press the |Acc| key [36] to scroll one line up or down.

**NOTE** *The scrollbar only appears when there are more physician names than can be displayed.*

- 2 Using the keyboard [21], enter the new name into the field and press the |Acc| key [36] when finished.

A maximum of 50 names may be stored in the list. When trying to enter a new name when this number has been reached, or the new entered name has been used before, a warning message is displayed.

The list is now updated with the new name inserted in the correct alphabetic order.

#### Tip

##### Physician

Only the first three characters of the entered name are displayed on the 'Administration' page.

It is advisable to use an abbreviation for these first three characters.

- 3 To modify or delete an existing name, scroll to the name to be changed and either, enter the new physician name or use the backspace key to remove it.

#### NOTE

***If a physician's name which has been used in previous examination is modified, the name on these previous examinations will not be updated.***

### Altering the Date/Time fields

- 1 Using the trackball [34], move the pointer to the 'Date' or 'Time' field and press the |Acc| key [36].
- 2 Using the keyboard [21], enter the new value in the related field and press the |Acc| key [36]. The format required is set during system installation.

The display of the current date/time changes.

### Changing the language

- 1 Using the trackball [34], move the pointer to the line below 'Language' and press the |Acc| key [36].  
A list appears with the available languages.
- 2 Using the trackball [34], select the language and press the |Accept| key [36].

#### NOTE

***This choice is only valid until the BV Libra is switched off. When the BV Libra is switched on again, it reverts to the default language as set-up in installation.***

#### Tip

##### Language

The change here is valid until the BV Libra is restarted.  
For changing the default language contact the local Service Organization.

### Testing the printer and monitor

- 1 Using the trackball [34], move the pointer to the |Printer| or |Monitor| button and press the |Acc| key [36].  
A test image is displayed on the monitor for testing the printer or the monitor respectively.
- 2 To remove the test image from the monitor, press the |Patient administration| key [22]. The 'Patient administration' page is displayed.



### Enabling Service access

Access to the system for Service operations must be granted explicitly by the user.

- 1 Using the trackball [34], move the pointer to the |Enable Service| checkbox and press the |Acc| key [36].

The monitor displays the message 'Service Enabled'.

- 2 To prevent unauthorised access to the system, the |Enable Service| checkbox should be unchecked after Service operations have been performed.

#### NOTES

- **For security reasons, the |Enable Service| checkbox is unchecked automatically when the system is switched off.**
- **Service access uses an ethernet network connection. Service actions may therefore have an impact on system performance.**

## 3.3 Customizing

Some system parameters can be altered during installation to optimize performance during special applications or to meet personal preferences. To change these parameters ask the local Service Organization.

Settings	Possibilities
Hospital name	Free
Language	English <sup>1</sup> , French, Spanish, German, Swedish
Date format	DD/MM/YYYY <sup>1</sup> , YYYY/MM/DD or MM/DD/YYYY
Units of measurement	mm <sup>1</sup> or inch
Camera angle	0...359 (default 0)
Add text during live	Yes or no <sup>1</sup>
Use date of birth field as	Date of birth or remark (default Date of birth)
Cocktail contrast/brightness <sup>4</sup>	1: 50...150% (default 115% / 104%)
	2: 50...150% (default 130% / 109%)
	3: 50...150% (default 150% / 113%)
Run buffer	50 images - 5...45 (default 10)
	500 images - 10...495 (default 100)
	1,000 images - 10...500 (default 100)
Frames per second	For HDF: 0, 1, 2, 3 or 5 (default 0) (5 fr/sec only for 1000 images option)
Noise reduction	1...6 (default 3, for half dose default 4)
Fluoro only	On or off
LIH store	For LDF or HDF: False <sup>2</sup> or true <sup>3</sup>
VCR auto recording	False or true (depending on examination type)
Movement detection	On or off

Settings	Possibilities
Contrast	-49 to +49 (default 0)
Brightness	-49 to +49 (default 0)
Edge enhancement	Off, 1 to 15
Video invert	On or off <sup>1</sup>
Legal settings	Entrance dose (kV) limitation (only after consulting local authorities)
Printer settings	
- Brightness selection (gamma curve) for paper/transparency	Varies. See printer's manual
- Auto cut paper/transparency	On or off

<sup>1</sup> Default factory setting

<sup>2</sup> Default factory setting for LDF

<sup>3</sup> Default factory setting for HDF

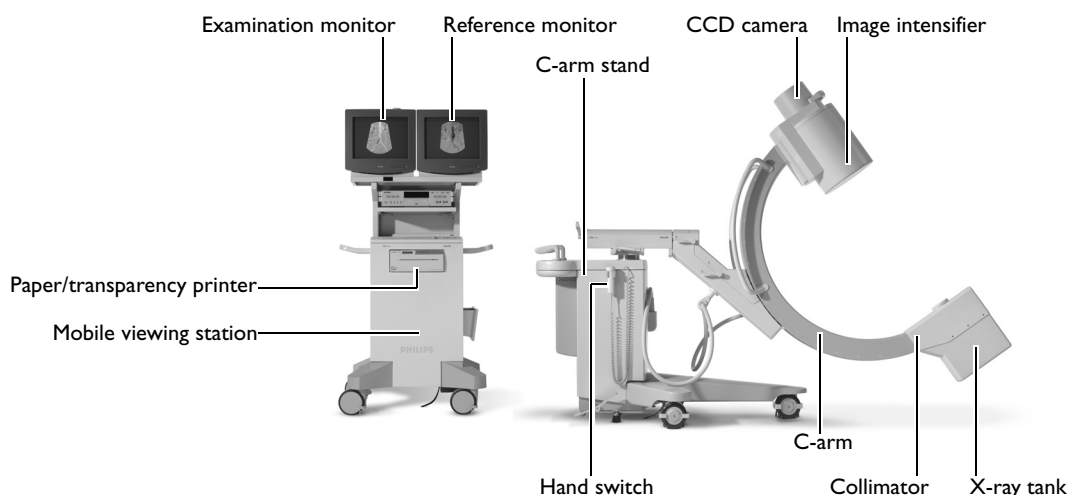
<sup>4</sup> The factors are coupled. Value: <contrast>/<brightness>

## 4 System overview

### 4.1 About the BV Libra system

The BV Libra is a mobile diagnostic X-ray image acquisition and viewing system. It is designed for medical use in surgical theatres. The system is comprised of two main components:

- C-arm stand
- mobile viewing station.



**Figure 4.1** System components

### 4.2 Configuration

#### 4.2.1 The C-arm stand

##### **X-ray tank**

The X-ray tank houses the X-ray tube, which has a fixed anode for maximum endurance.

##### **Collimator**

The iris collimator limits the X-ray beam to the actual field of view of the image intensifier. Fully lead shutters can be independently moved and rotated to avoid direct radiation on the image intensifier and reduce scattered radiation. A built-in, additional, beam filter reduces patient skin dose by 40% over conventional filters.

### Image intensifier and camera

The image intensifier has a compact rotatable CCD TV camera with a patented anamorphic lens system and a carbon fibre X-ray grid for reducing scattered radiation.

For the BV Libra there is a choice of two image intensifiers:

- 15 cm (6 inch) - single mode
- 23/17/14 cm (9/7/5 inch) - triple mode.

### System lock

The system lock prevents radiation and height movement and is controlled by a key.

### Hand switch

The hand switch, which is connected to the C-arm stand, is used to perform fluoroscopy for Low Dose Fluoroscopy, High Definition Fluoroscopy and radiography.



**Figure 4.2** Hand switch (left) and foot switch (right)

### Foot switch

The foot switch, connected at the connector panel of the C-arm stand, is used to perform fluoroscopy for Low Dose Fluoroscopy, High Definition Fluoroscopy and switching between the fluoro modes.

### C-arm and C-arm stand movements

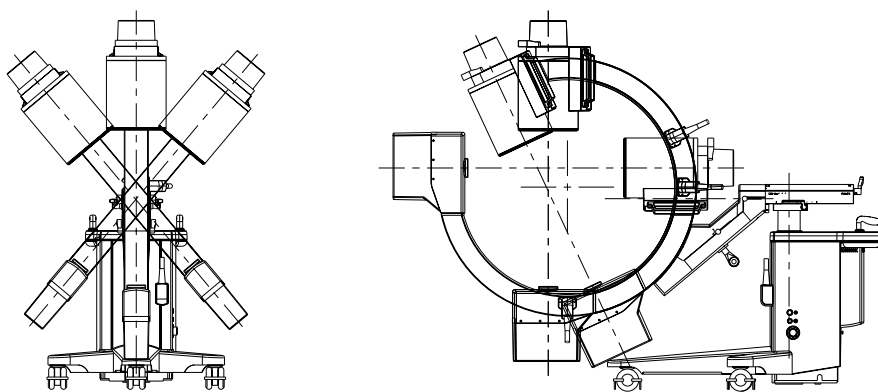
The C-arm is fully counterbalanced and the brakes are manually controlled. The height movement is motor-driven.

The steering handles are coupled and control the rear wheels. The front wheel swivels freely. See Section 5.1, 'Transportation' for more information about the steering.

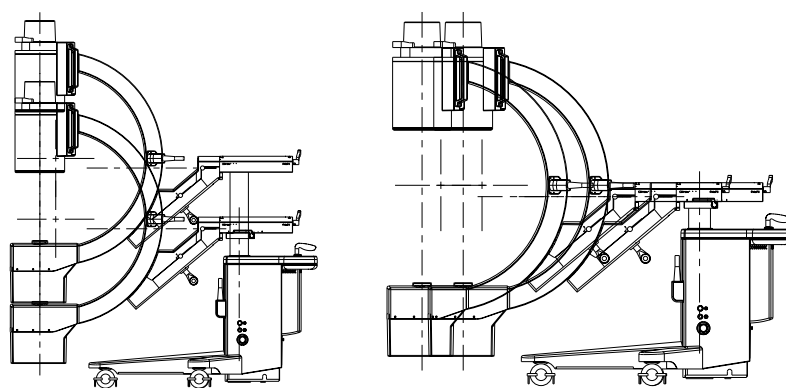
The C-arm stand is equipped with a brake. See Section 5.1, 'Transportation' for more information about using the brake.

All wheels are provided with cable deflectors.

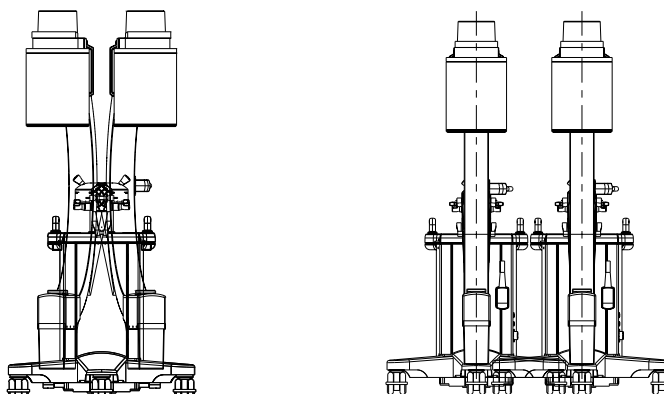
The movements are shown in the figures below.



**Figure 4.3** C-arm rotation (left) and angulation (right)



**Figure 4.4** C-arm vertical (left) and longitudinal (right) movement



**Figure 4.5** C-arm panning (left) and parallel (right) movement

## Controls, displays and indicators

### The C-arm stand console

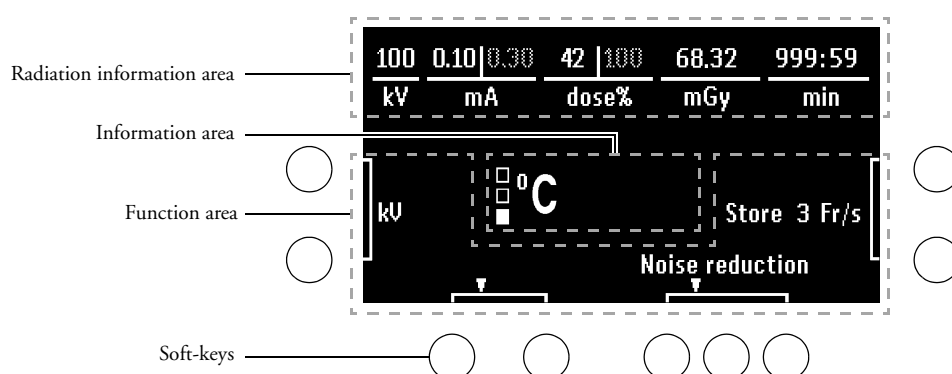
The C-arm stand console controls all functions related to performing fluoroscopy and exposure. The console consists of keys and an EL display. The motorized height movement is controlled using keys on either side of the C-arm console.

The functions of the keys are described in Section 5, 'Operation'.

For an overview of the console see Section 11.3, 'Legend'.

After start-up of the system the 'Function' display is shown. This display can be divided into three main areas:

- radiation information area
- function area
- information area.



**Figure 4.6** Screen layout of the C-arm stand display

### Radiation information area

This area shows real-time radiation information of the:

- kV value
- average mA or mAs value (see note)
- dose rate (see note), as a percentage of the maximum continuous HDF possible (depends on the kV/mA(s), collimation and II size)
- the display shows dose rate during loading, and shows cumulative dose after loading
- cumulative fluoroscopy time, in 'mm:ss' format.

#### NOTE

**The value is displayed for both the left and right hand/foot switch function. The last used key of the hand/foot switch is displayed normal, the other is greyed-out.**

### Function area

System settings, displayed in the 'Function settings' area can be changed using the soft-keys [20] respectively below and beside the function items. Pressing a soft-key will change the value of the displayed setting.

If a menu is accessed, but no choice is made within approximately seven seconds the system returns to the functions.

For more information about the menu tree, see Section 10.2 'Menu and function selection tree'.

### *Information area*

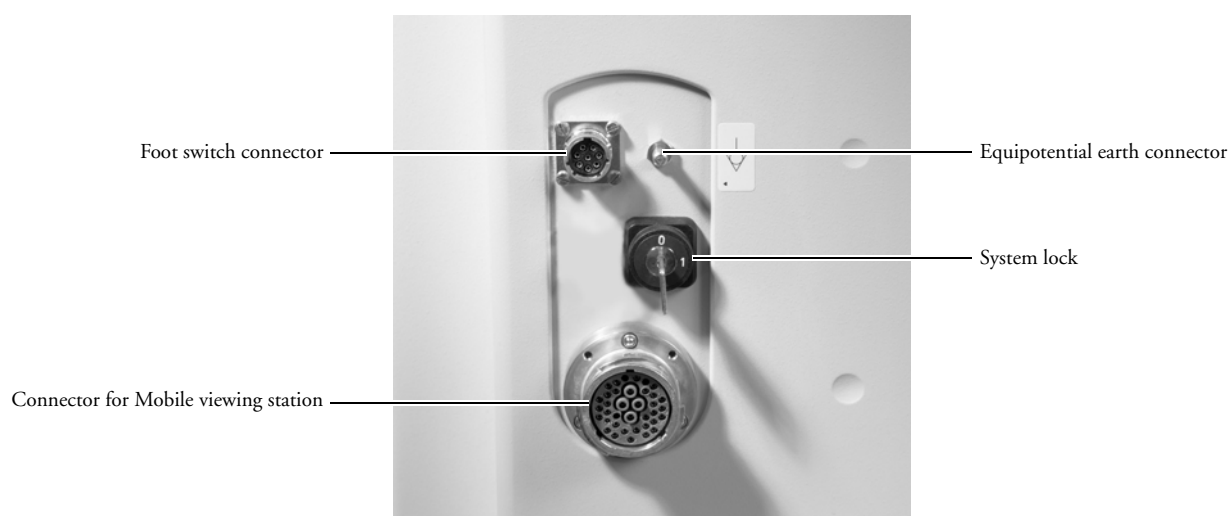
The centre part of the display shows information about:

- the temperature level of the X-ray tank or the tube (when warm)
- the radiation status (a radiation symbol is displayed during radiation)
- system messages.

### **The C-arm stand connector panel**

The C-arm stand connector panel is located on the front left-hand side of the C-arm stand. The C-arm stand connector panel consists of the following items:

- foot switch connector
- equipotential earth connector
- feature extension
- system lock
- Mobile viewing station to C-arm stand interface connector.



**Figure 4.7** C-arm stand connector panel

### 4.2.2 The mobile viewing station

#### Monitors

The BV Libra mobile viewing station can be equipped with one or two monitors:

- an examination monitor for live fluoroscopy, roadmaps, Last Image Hold (LIH) images, etc.
- a reference monitor for reference images (pseudo biplane).

Both monitors have an automatic brightness control, which automatically adapts to ambient light levels.

#### Using the mobile viewing station as a stand-alone unit

The mobile viewing station can be used as a stand-alone unit, i.e. without the C-arm stand connected, for viewing/archiving and post-processing purposes.

#### Steering

The mobile viewing station brake has release/apply positions and a locked position for easy (parallel) transportation.

All wheels are provided with cable deflectors.

#### Controls, displays and indicators

The mobile viewing station console controls all functions related to examination, image and patient handling. The console consists of a keyboard and keys.

The functions of the keys are described in Section 5, 'Operation'. For an overview of the console see Section 11.3, 'Legend'.

#### X-ray on indicator

The indicator lights as soon as X-rays are present (fluoroscopy or radiography). It is located on the top of the examination monitor.

#### Monitor controls and indicators

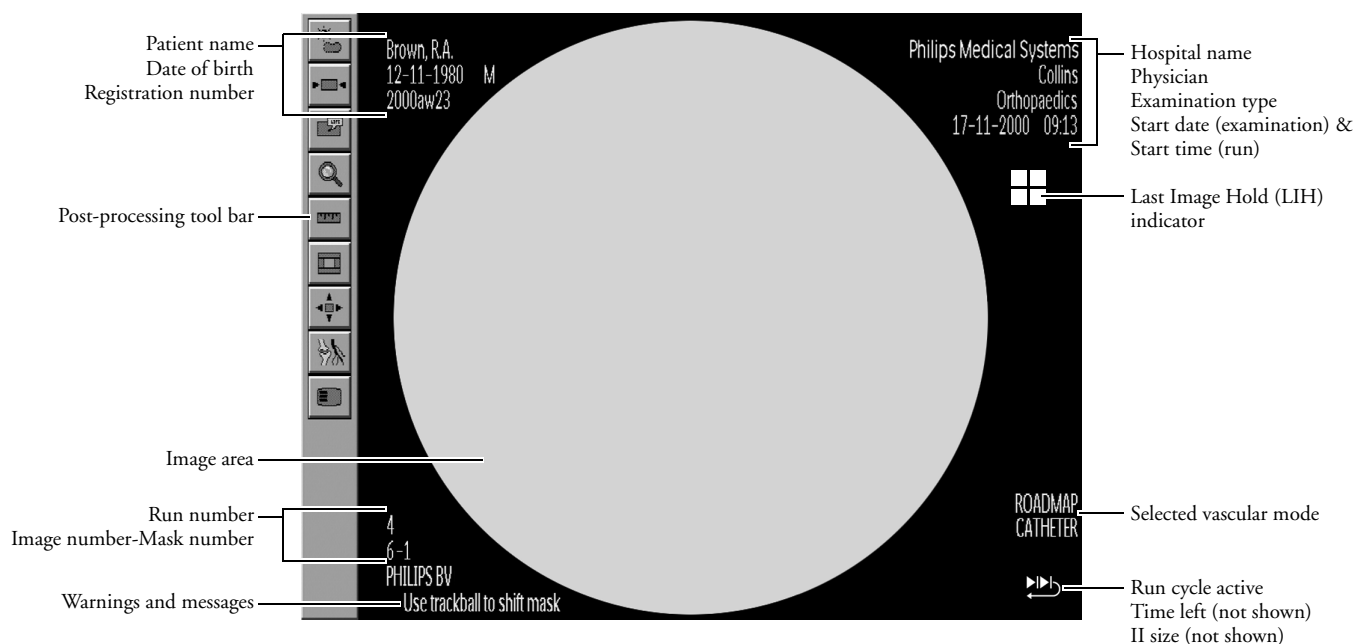
The monitor controls and indicators are described in Section 5.7, 'Monitor settings'.

#### ABC control

The Automatic Brightness Control (ABC) sensor detects the ambient light level and adjusts both brightness and contrast levels of the displayed image(s).

**Monitor display (images)**

The following figure gives an example of the layout displayed on the examination monitor.



**Figure 4.8** Layout of the Acquisition ready screen

**Monitor display (other)**

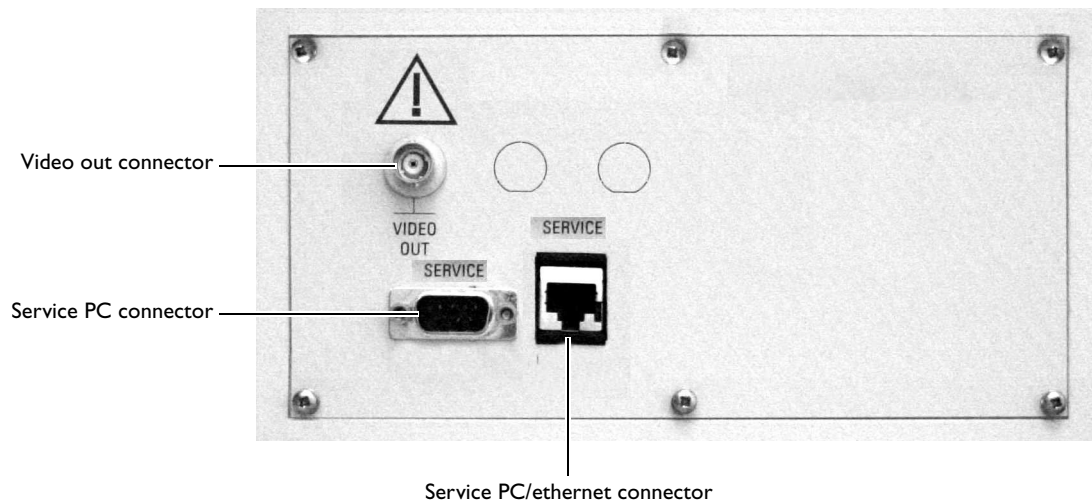
The following pages can also be displayed on the monitor:

- patient administration (Section 5.5)
- overview (Section 5.13.2)
- dose report (Section 5.13.5).

### 4.2.3 Mobile viewing station connector panel

The mobile viewing station connector panel is located on the right-hand side of the mobile viewing station and contains the following:

- video out connector
- network connector
- Service PC connector.



**Figure 4.9** Mobile viewing station connector panel



#### WARNINGS

- **Do not touch the pins of the stand/mobile viewing station cable or the central pin of the video out connector when touching the patient.**
- **Optional equipment is only to be used if it is CE labelled and fully compatible with the BV Libra. The use of accessory equipment not complying with the equivalent safety requirements of the BV Libra may lead to a reduced level of safety in the resulting system. Any patient environment equipment connected to BV Libra must comply with UL2601-1 and IEC 60601-1 requirements. Equipment outside the patient environment may only be connected to the BV Libra if it complies with the relevant UL and EN/IEC standards.**

## 4.3 Options and accessories



### WARNING

*Only the options and equipment delivered by Philips Medical Systems may be used in conjunction with the BV Libra. The use of accessory equipment not complying with the equivalent safety requirements of this equipment may lead to a reduced level of safety in the resulting system. Consideration relating to the choice shall include:*

- *use of the accessory in the patient vicinity*
- *evidence that the safety certification of the accessory has been performed in accordance with the appropriate IEC 60601-1 and/or IEC 60601-1-1 harmonized national standards.*

### 4.3.1 High-end monitors

Two 17 inch monitors featuring:

- extra bright images, high contrast and high resolution TripleGun CRT
- 75 Hz non-interlaced display for a sharp, high resolution display of the finest details, eliminating both line and field flicker
- ambient light dependent contrast and brightness control.

Adjustment of contrast and brightness is configurable by a service engineer only.

### 4.3.2 Flat screen LCD monitors

Two 18.1 inch flat screen LCD monitors featuring:

- 75 Hz non-interlaced display, ensuring flicker-free, bright images with excellent contrast and detail visibility
- dark screen and frame
- flexible vertical and rotational movement on the mobile viewing station.

Adjustment of contrast and brightness is configurable by a service engineer only.

### 4.3.3 Standard DICOM package

An interface between the mobile viewing station and the hospital/department network. It complies with the DICOM 3.0 standard.

This option allows images of a completed examination to be exported to a network storage device or sent to a network printer for output. Available formats are:

- DICOM SC (Secondary capture)
- XA (X-ray angiographic) format.

Images can be selected for export or print while the BV Libra is not connected to the network. These images will be held in a queue and sent when the system is reconnected to the network.

### NOTE

*The examination dose report can be exported or printed with this option also.*

#### 4.3.4 Advanced DICOM package

The Advanced DICOM package extends the functionality of the DICOM interface with the following features:

- **Worklist management (WLM)**  
Allows the mobile viewing station to receive scheduled patient data from a WLM server on the hospital/departmental network.
- **Modality Performed Procedure Step (MPPS)**  
Provides examination progress and status information that can be used for reporting purposes.
- **Storage commit**  
Provides confirmation that images have been safely archived after exporting to a network storage device.

**NOTE** *The Advanced DICOM package option requires the Standard DICOM package.*

#### 4.3.5 ViewForum Surgical Workstation

The ViewForum Surgical Workstation option provides access to pre-operative acquired images on the mobile viewing station. Acquired images can be received from the hospital network, from a DICOM CD, or from the BV Libra itself.

The option is designed to replace the conventional lightbox with side-by-side comparison of intra-operative and pre-operative images on the mobile viewing station. The combination of the ViewForum Surgical Workstation and the BV Libra optimizes surgical planning and improves patient outcome.

The ViewForum Surgical Workstation is pre-configured to provide the surgical user with appropriate image viewing and processing functions, and includes storage to any USB medium. To enhance the capability of the ViewForum Surgical Workstation, the following optional features can be added to the standard configuration:

- DICOM store to DVD
- MIP/MPR package
- Procedure reporting package.

#### 4.3.6 Password protection

Patient data on the mobile viewing station can be protected from unauthorised access with a password. Patient data cannot be viewed or accessed until the correct password is entered.

**NOTE** *It is always possible to create an emergency examination and make exposures for a new patient without entering the password.*

A new password is set by Service during installation. After installation, Service, or an appropriate hospital staff member, can change the password or disable password protection altogether (it can be enabled again at a later date).

#### 4.3.7 Paper/transparency printer

There are two possibilities for printing video images:

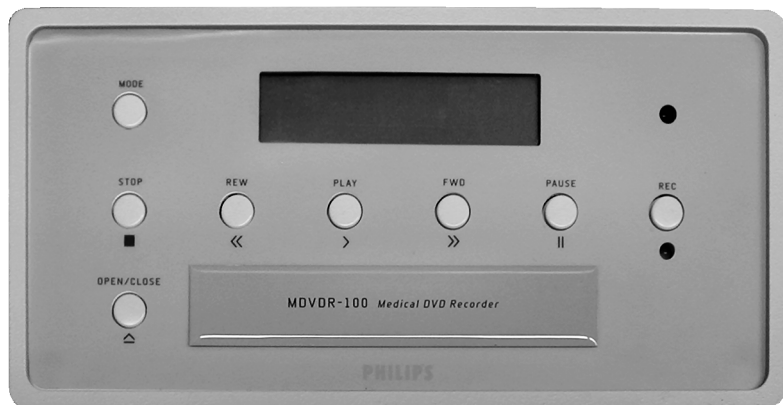
- Sony™ UP-960 for printing on paper
- Sony™ UP-980 for printing on paper or transparency film.



**Figure 4.10** Printer

#### 4.3.8 Medical DVD Recorder (MDVDR)

The Medical DVD Recorder (MDVDR) is available as an option to record and replay images and runs on DVD media.



**Figure 4.11** Medical DVD Recorder

### 4.3.9 Laser positioning devices

There are two laser positioning device variations:

- laser alignment tool
- laser aiming device (9 inch version only).

Using laser light, the laser positioning device projects a cross or point on the patient. The centre of the projected cross or point corresponds with the centre of the X-ray beam. It is used to:

- position the C-arm, minimizing the amount of radiation for the patient/staff
- quickly and precisely align objects with the centre of the X-ray beam
- mark the centre of the X-ray beam on the skin of the patient, for incisions and foreign body removal.



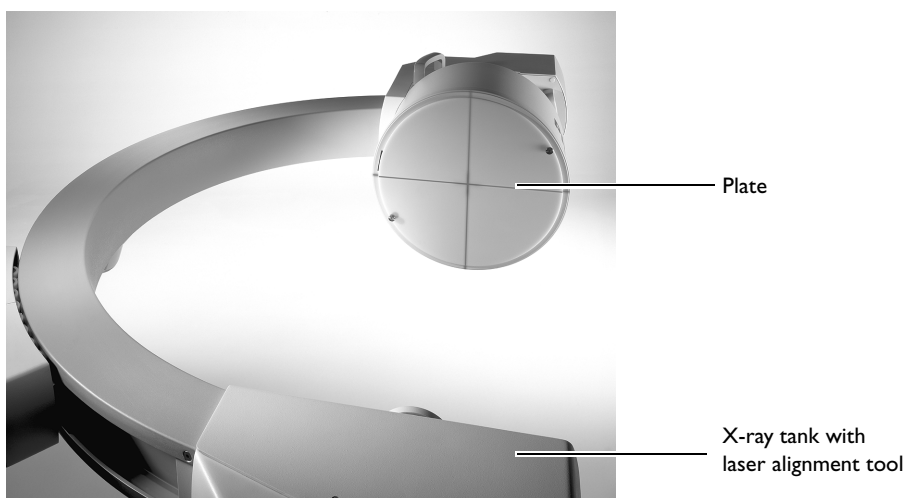
#### WARNING

**The II LAT and the tank LAT plate should be removed when not in use.**

#### Laser alignment tool

The laser alignment tool (LAT) is built into the X-ray tank. It projects a cross hair on to the image intensifier entrance screen. It is switched on and off with the [LAT on/off] key [4] on the C-arm stand console.

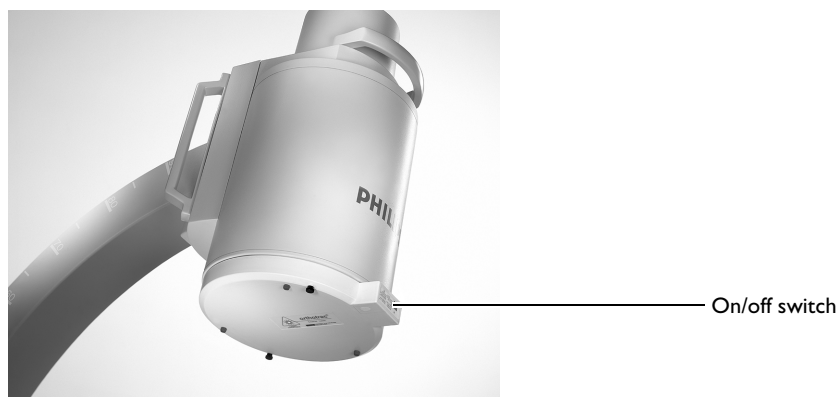
A plate can be fitted to the image intensifier entrance screen, this plate has a lead cross which corresponds with the cross hair projection of the LAT for accurate positioning during X-ray. The plate can be removed when not required.



**Figure 4.12** Laser alignment tool

### Laser aiming device

The laser aiming device is installed on the image intensifier and produces a point on the X-ray tank. The laser aiming device is switched on and off using the switch on the device. The laser aiming device can be removed.



**Figure 4.13** Laser aiming device

#### 4.3.10 Memory extension

A memory extension for the number of images to be stored. The memory extension option can provide:

- 50 images (maximum storage speed: 3 frames per second)
- 500 images (maximum storage speed: 3 frames per second)
- 1000 images (maximum storage speed: 5 frames per second).

#### 4.3.11 Vascular package

This package contains the following vascular functions:

- subtraction
- remasking.

#### 4.3.12 Processing

This option extends the system with the following processing:

- contrast, brightness and edge enhancement
- overwrite manual adjustment
- annotation.

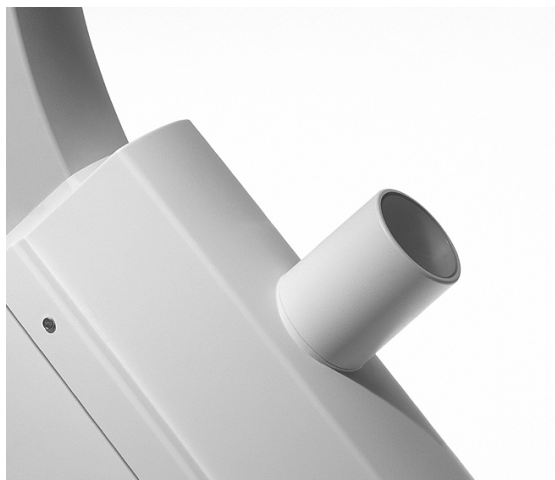
#### 4.3.13 Extended processing

This option extends the system with the following extended processing:

- manual electronic shuttering
- zoom and pan
- measure functions.

#### 4.3.14 Spacer

The minimum source-skin distance is 20 cm. In some countries a 30 cm spacer is required. This spacer is delivered as an option.



**Figure 4.14** Spacer

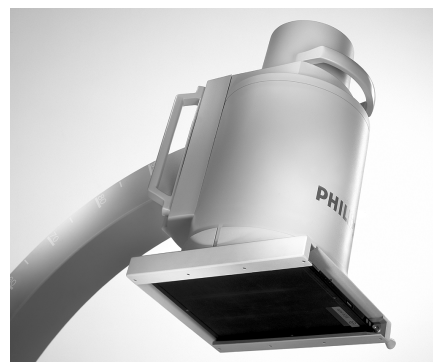
#### 4.3.15 Detachable cassette holder

The detachable cassette holder fits over the input window of the image intensifier. The size of the X-ray beam can be selected on the C-arm stand console, but is limited to a circular shape. The cassette holder can be rotated a full 360°.

The following cassettes are accepted:

- 24 x 24 cm
- 24 x 30 cm.

The cassette holder must be prepared by a Service technician for one of the sizes.



**Figure 4.15** Cassette holder

#### 4.3.16 Sterile covers

Sterile fabric cover sets are available in order to help maintain the integrity of the sterile field. Both sterile transparent and green cloth covers can be used. Separate covers are available for the:

- C-arm
- image intensifier
- X-ray tank unit.



**Figure 4.16** Sterile covers

A spring bow is used to hold the sterile cover of the C-arm in position, while allowing free movement of the C-arm.



## 5 Operation

### 5.0 Introduction

This chapter describes the procedures required to operate the BV Libra.

#### 5.0.1 Safety

It is mandatory for the operator to be familiar with the safety procedures as described in Section 2, 'Safety'.



#### WARNINGS

##### Safety awareness

- **Do not start up the BV Libra unless you and all other users present have read, fully understood and know all the safety information and emergency procedures given in Section 2, 'Safety'.**
- **Operation of the BV Libra without having read, understood and knowing ALL the safety information and procedures in Section 2 could lead to fatal or other serious personal injury. It could also lead to clinical misdiagnosis/mistreatment.**

##### Maintenance & faults

- **Do not use the BV Libra for any medical application unless you are certain that the User Routine Checks Programme has been satisfactorily completed, and that the Planned Maintenance Programme is up-to-date.**
- **If any part of the BV Libra is known (or suspected) to be defective, DO NOT USE IT until a repair has been made. Operation of the BV Libra with defective components may expose the user or a patient to radiation or other safety hazards. This, in turn, could lead to fatal or other serious personal injury. It could also lead to clinical misdiagnosis/mistreatment.**

For information about the user routine checks programme and the planned maintenance programme see Section 7, 'Maintenance'.

##### Operator knowledge

- **Do not operate the BV Libra with patients unless you have a good understanding of its capabilities and functions. Using this equipment without such an understanding may compromise its effectiveness and/or reduce the safety of the patient, user and others.**

It is strongly recommended to read this Instructions for use before using the systems. Be cautioned to stay within the operating procedures and intended uses described in this Instructions for use.

## 5.1 Transportation

### Putting the system in the transport position

- Longitudinal travel 0 cm position
- Panning movement 0 ° position
- Height movement -6 cm position
- Rotation in 0 ° position
- Angulation in 0 ° position.

### Moving the C-arm stand

- 1 Release the brake.
- 2 Push the stand using the handgrips. Both handgrips are coupled and control the rear wheels for parallel movement. The front wheel is free swivelling.
- 3 When the stand is in the required location, position it exactly using the handgrip(s).
- 4 Apply the brake.

### Transporting and manoeuvring the C-arm stand

- 1 Use both steering handles to move the C-arm stand.

### Controlling the rear wheels

- 1 The rear wheel steering handgrips have three pre-defined ('click') positions, straight-ahead, left and right.
- 2 When the handgrips are in a pre-defined position, lift them up a bit before rotation.
- 3 Use the rear wheel steering handgrips to control the rear wheels.

**Transport position**

With the rear wheel steering handgrips in the straight-ahead position, the rear wheels point to the front of the stand.



**Figure 5.1** C-arm stand brake, transport and steering handle

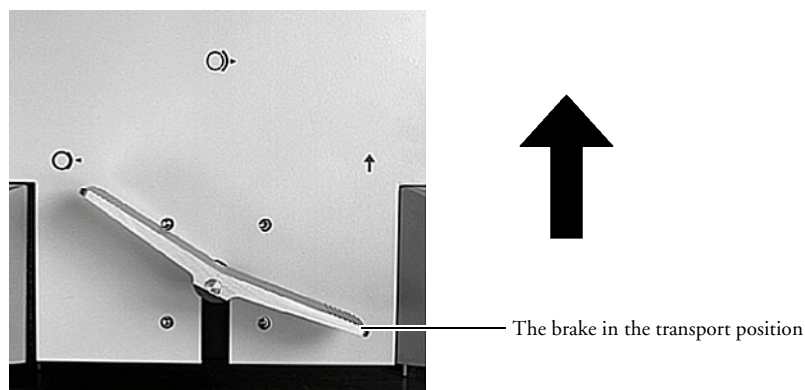
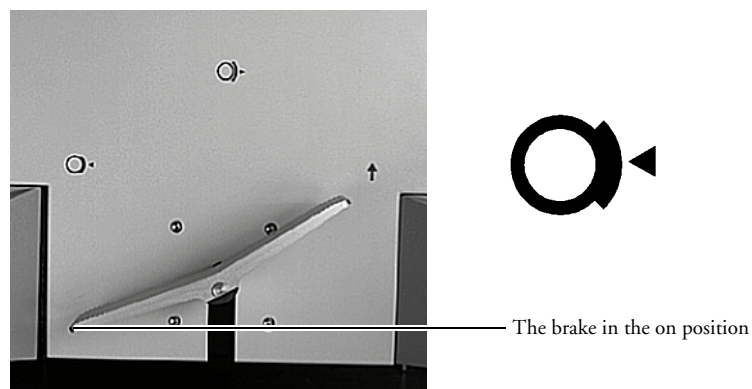
**Parallel movement**

With the rear wheel steering handgrips in the left or right position, parallel movement of the stand is enabled. In either left or right position, the stand can be moved in a straight line sideways.

Also, all wheel positions in between the pre-defined positions can be set in order to perform the parallel movement.

**Moving the mobile viewing station**

The mobile viewing station can be moved using the push bars. Two wheels can be locked for transport over long distances. The brake pedal has three positions as shown below.

**Figure 5.2** 'A' Wheel directional lock position**Figure 5.3** 'B' Brake released**Figure 5.4** 'C' Brake applied

- 1 Press the brake pedal to position 'B' to release the brake. The mobile viewing station can move freely.
- 2 Press the brake pedal to position 'A' for long distance movement. Two wheels are locked for parallel in 'forward' direction.
- 3 Press the brake pedal in position 'C' to apply the brake.

**NOTE**

*When moving through corridors etc., it is advisable to pull the trolley with the handle opposite to the brake.*

## 5.2 C-arm brakes and movements

### Brakes



#### WARNING

*Although the movements are balanced it is strongly recommended to apply the C-arm brakes when the C-arm is in position.*

The rotation, angulation, longitudinal and panning (scan) brakes have symbols to indicate their movements and status. When the brake is released, the handle points to the 'unlocked' symbol. When the brake is applied, the handle points to the 'locked' symbol.



**Locked symbol**

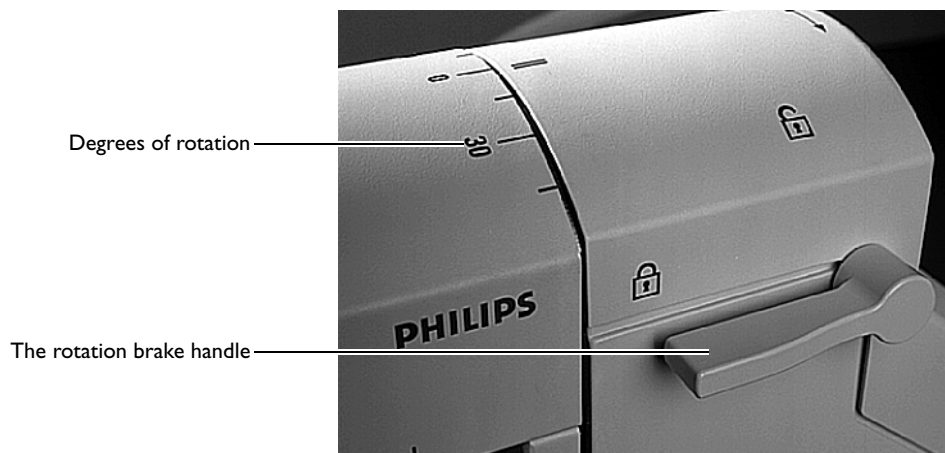


**Unlocked symbol**

### Rotation

To release the rotation brake, move the brake handle to the unlocked (vertical) position.

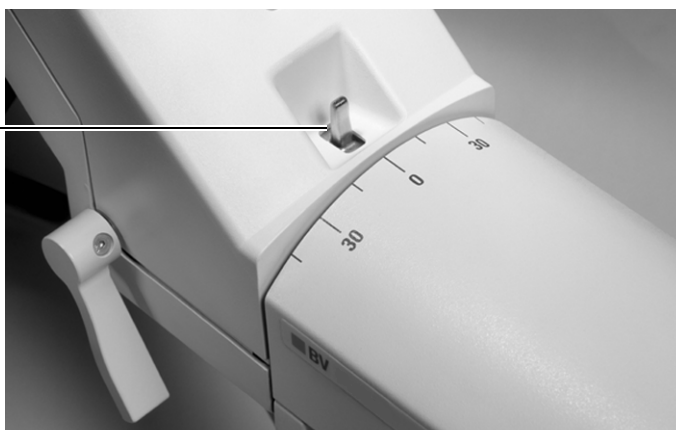
To re-apply the brake, return the brake handle to the locked (horizontal) position. The degree of rotation is indicated on the scale.



**Figure 5.5** The rotation brake handle

The range of rotation with the safety stop on is  $-135^{\circ}$  to  $+135^{\circ}$ . To extend the rotation beyond this range, press the safety stop release.

Rotations safety stop lever  
(located at the underside of the C-arm)



**Figure 5.6** The rotation safety stop



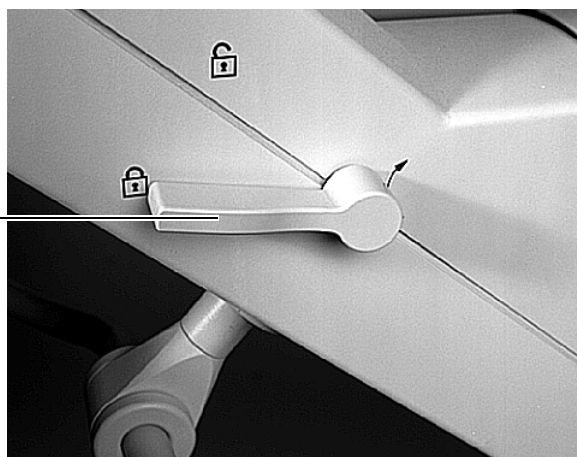
#### WARNING

*If the rotation safety stop is released in the 9" image intensifier version and it is being used in the under table position, it could collide with the stand. Both 6" and 9" versions could also collide with the floor. Therefore take extra care when the rotation range is increased.*

#### Angulation

To release the angulation brake, move the handle to the unlocked position. To re-apply the brake, return the handle to the locked position.

The angulation brake handle



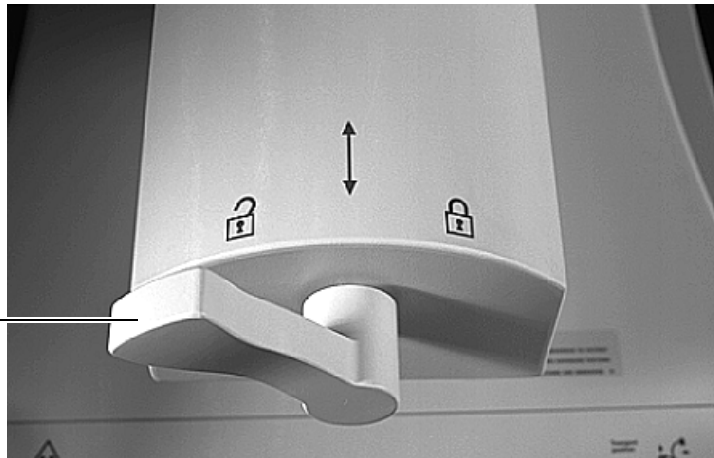
**Figure 5.7** The angulation brake handle

The degree of angulation is shown on the scale. The angulation range is  $-25^{\circ}$  to  $+90^{\circ}$ .

**Longitudinal movement**

To release the longitudinal brake, move the handle to the unlocked position.  
To re-apply the brake, return the handle to the locked.

The longitudinal brake handle



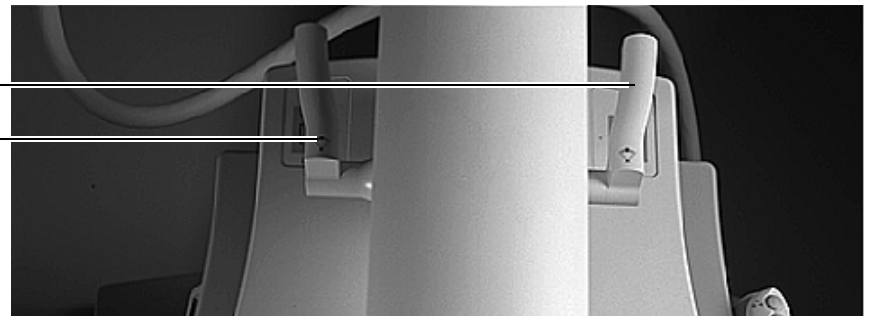
**Figure 5.8** The longitudinal brake handle

The longitudinal movement is shown on the scale.  
The longitudinal movement range is 20 cm.

**Panning movement**

To release the panning movement brake, move the two handles upwards.  
To re-apply the brake, return the handles to the horizontal position.

The panning brake handle

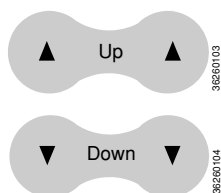


**Figure 5.9** The panning (scan) brake

The panning range is  $-10^{\circ}$  to  $+10^{\circ}$ .

### Height movement

The adjustment of the height is controlled by keys next to the C-arm column on both sides of the C-arm stand. For safety reasons, both keys must be pressed simultaneously.



- 1 Switch on the C-arm stand.
- 2 Make sure the system lock key is in the enabled (I) position.
- 3 Press both [Up] keys [37] simultaneously to move the C-arm upwards. The upwards movement will continue until the keys are released or when the up limit is reached.
- 4 Press both [Down] keys [38] simultaneously to move the C-arm downwards. The downwards movement will continue until the keys are released or when the zero position is reached.
- 5 At the zero position, the movement stops and the indicator above the keys is on.
- 6 To continue the downwards movement (to the extended range of -6 cm), press both [Down] keys [38] again. An audible signal is given at the beginning of this movement and the indicator remains lit.

### CAUTIONS

- *There is the possibility of a collision when moving the BV Libra in the extended range. Also, a 9" image intensifier used in the under-table position could collide with the C-arm stand. Both 6" and 9" image intensifiers can collide with the floor. Therefore, extra care must be taken when using the BV Libra in the extended range.*
- *When the indicator flashes, the central circuit has detected a failure and the height movement is disabled.*
- *If only one key is pressed, movement in either direction should not occur. If one key is released during the movement, it must stop immediately. The correct functioning of the height movement must be checked daily as prescribed in Section 7.2, 'User routine checks programme'. Any errors in this respect must be reported to the local Service Organization.*



### WARNING

*If any irregularities occur in either direction of the height movement during use, switch off the BV Libra as described in Section 5.3.5, 'Emergency off'.*

## 5.3 System On/Off

### 5.3.1 Connecting the system



#### WARNING

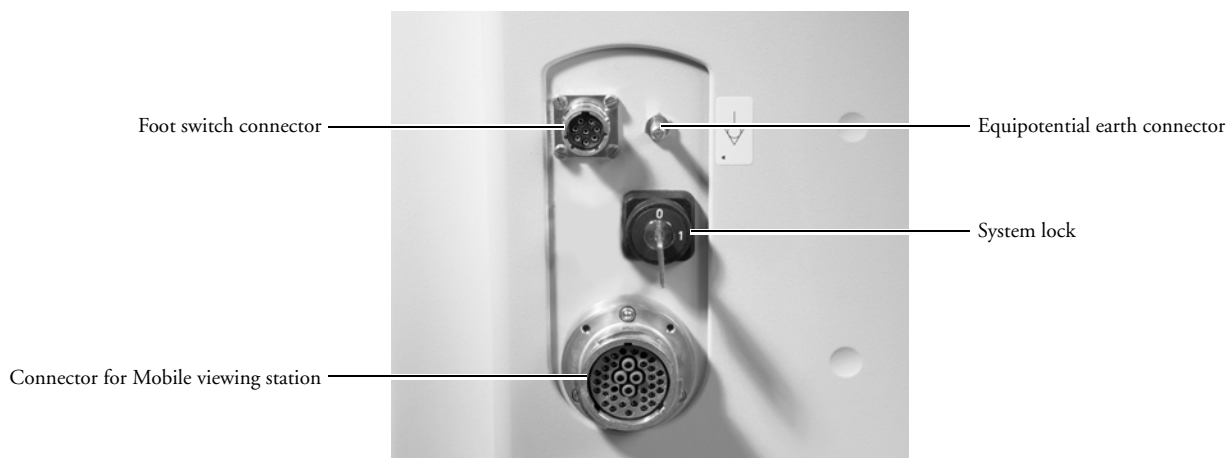
**Optional equipment is only to be used if it is CE labelled and fully compatible with the BV Libra. The use of accessory equipment not complying with the equivalent safety requirements of the BV Libra may lead to a reduced level of safety in the resulting system. Any patient environment equipment connected to the BV Libra must comply with UL2601-1 and IEC 60601-1 requirements. Equipment outside the patient environment may only be connected to the BV Libra if it complies with the relevant UL and EN/IEC standards.**

When the C-arm stand and the mobile viewing station are in the desired position, make the following electrical connections.

#### CAUTION

**Make sure that the socket outlet is provided with proper ground connection accepting grounding cord plugs. The resistance in the socket outlet must conform to the mains supply specifications as described in Section 9, 'Technical data'.**

- 1 Connect the mobile viewing station–C-arm stand interface cable to the C-arm stand connector panel. The red dot on the cable connector must be aligned with the red dot on the connector panel. Turn the fastener clockwise to secure the connector.



**Figure 5.10** C-arm stand connector panel

- 2 Connect the mains power cable of the mobile viewing station to a suitable mains power outlet socket.
- 3 If applicable, connect the foot switch to the C-arm stand connector panel.

#### System lock

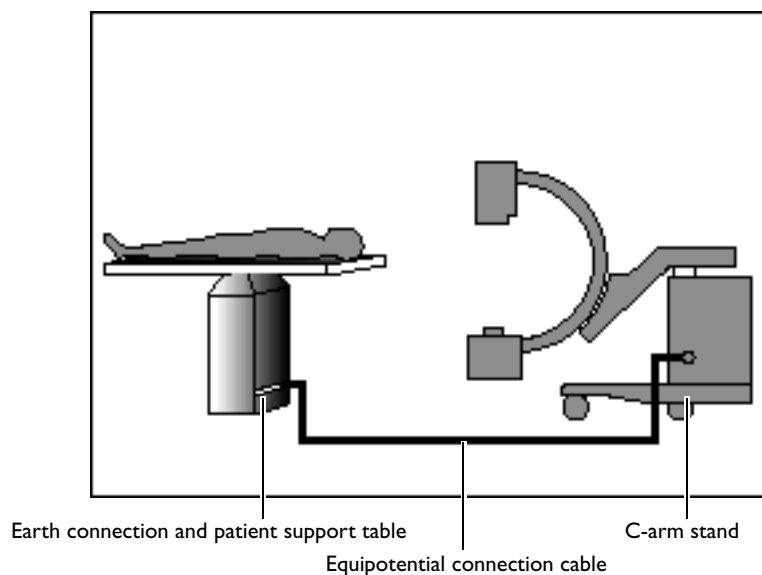
Before the system is switched on the system lock should be set to the '0' position to prevent unwanted X-radiation. Radiation should only be enabled (system lock set to the '1' position) during the procedure and for positioning the height movement.

If the system lock key is in the 'disable' position (turned to the '0' symbol), all X-ray functions are disabled and a message appears on the C-arm display. The height movement is also blocked.

## Equipotential earth (ground) connection

**WARNING**

*An equipotential earth (ground) connection is required for the safety of patient and user (IEC and VDE regulations). The connection is made as shown in the figure below.*



**Figure 5.11** Equipotential earth connection

The system is provided with a yellow-green cable for equipotential earth connection between the C-arm stand and the patient support table. The connection point is indicated by the equipotential earth symbol.

Alternatively, both the C-arm stand and the patient support table may be connected to an earth (ground) bus bar provided for this purpose by the hospital.

## 5.3.2

## Switching the system on



- 1 To switch the system on, press either the [System on] key [A] on the C-arm stand or [D] on the mobile viewing station.

When the system is switched on it performs a system initialization and a self-test. A start-up screen is displayed on both the monitor and the C-arm stand display.

The system is ready to be used when:

- the mobile viewing station shows the 'Patient administration' screen on the examination monitor
- the C-arm stand display shows the status and settings
- no error messages are given.

**CAUTION**

**To prevent malfunction, do not touch any key (except the height movement) during the start-up process.**

**NOTE**

**If the Password protection option is installed, the Password panel also appears after the system has started up. See the following section for details.**

Patient administration				Examinations			
Name	Sex	Date of Birth	Registration	Date	Type	Phys	Stat
Patient 01	F	01-01-1930	498745789	16-01-03	Vascu	RdC	22
Patient 02	M	03-04-1956	363467457	16-01-03	Vascu	RdC	268
Patient 03	M	13-12-1940	7547347	16-01-03	Non V	JWK	1
Patient 04	F	11-11-1911	43738473	17-01-03	Non V	RdC	2
No name	U			17-01-03	Non V		0
Patient 05	M	14-06-1944	6874365	17-01-03	Non V	DD	1
No name	U			17-01-03	Non V		0
Patient 06	M	31-12-1999	3754837332	17-01-03	Vascu	RdC	REV
No name	U			17-01-03	Non V		0
Patient 07	M	12-11-1980	628284		Non V	MH	SCH
Patient 08	F	23-06-1967	7236374		Vascu	JH	ACQ
No name	U				Non V		SCH

100	0.10	0.30	42	100	68.32	999:59
kV	mA	dose%			mGy	min
kV C Store 3 Fr/s						
Noise reduction						

**Figure 5.12** Start-up screens: mobile viewing station and C-arm stand

**Tips**

Stand alone mode mobile viewing station	The mobile viewing station can be used in stand alone mode (without the C-arm stand connected) for viewing and post-processing purposes.
System lock	To perform fluoroscopy and use the height movement the system lock must be enabled (key is in the 'I' position).
Height movement	Height movement can be used immediately after pressing one of the [System on] keys [A] or [D].

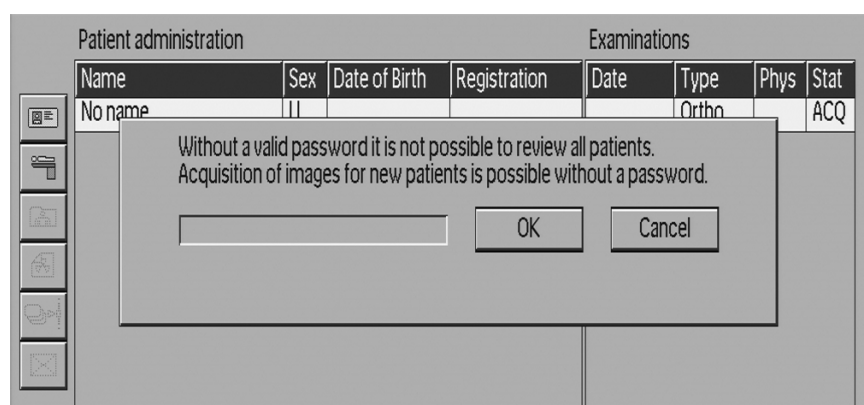
### 5.3.3 Password protection

The Password protection option protects patient data from unauthorised access. The operator must enter a valid password before:

- reviewing existing examinations
- using scheduled examinations
- using the Export function.

**NOTE** *It is always possible to create an emergency examination, acquire and review images for a new patient without entering the password.*

If this option is installed, the Password panel appears on top of the Patient administration panel after system start-up. Only the 'no name' examination is available in the Patient administration panel. To view the complete patient list a valid password must be entered.



**Figure 5.13** Password panel

- 1 Enter the password in the field provided in the Password panel.
- 2 Click 'OK'.
  - If the password is valid, the password panel closes and the full patient list is displayed. The operator has full access to all available functions on the system.

**NOTE** *When a valid password is entered, access to the system is authorised for the rest of the session and the password is not required again until the system is restarted.*

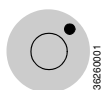
- If the password is not valid, the operator is asked to re-enter the password.
  - Three attempts to enter the password are allowed. If the third attempt is incorrect, the only option available in the Password panel is 'Cancel'.
- 3 Click 'Cancel' if no valid password is available.

After clicking 'Cancel', the operator may only create patients or acquire images with the 'no name' examination (see section 5.5 'Entering patient and examination data' for more information). It is not possible to query the WLM server or use the Export function, if installed.

- NOTES**
- *The operator may click the 'Cancel' button at any time in the Password panel to gain access to the system for new examinations only.*
  - *If the system is accidentally powered off, the password will be required to access stored examinations after the system restarts.*

## 5.3.4

## Switching the system off



- 1 Switch off the complete system using the red [System off] key [C] on the mobile viewing station.

Pressing the red [C-arm stand off] key [B] on the C-arm stand switches off only the C-arm stand.

#### Tips

Protect images	Before switching the system off, protect all required images.
Disconnection of the C-arm stand	It is possible to switch off the C-arm stand (and disconnect) during the examination. All settings etc. will be restored after reconnection.

## 5.3.5

## Emergency off

In case of a general emergency caused by the BV Libra, it is recommended to switch the system off, firstly:

- by removing the mobile viewing station mains power connector from the the mains power outlet socket.

Alternatively:



- by pressing the red [System off] key [C] on the mobile viewing station to switch off the entire system, or
- by pressing the red [C-arm stand off] key [B] on the C-arm stand to switch off the C-arm stand only.



#### WARNING

**When the BV Libra is switched off using both the [System off] keys, be aware that mains power is still applied to some circuits in the system until the mobile viewing station mains power connector is removed from the mains power outlet socket.**

If there were any unprotected images, a message will appear on re-start, asking if these images must be protected or not. (See also Section 5.14.1, 'Protecting an image'.)

### 5.3.6 Mains failure

#### After mains failure

- radioscopic imaging is not possible!
- all images from the current run are lost
- the dose report will not be updated for that run
- the motorized height movement is not available
- the DICOM network connection is lost and transfer tasks are aborted
  - tasks aborted during selection for transfer queueing are lost and will need to be selected and queued again
  - tasks aborted during actual transfer to the DICOM network are not lost, but will need to be transferred again by the operator from the 'Transfer panel'.

#### When the power returns

Switch on the system, the height movement can be used immediately. System restart time for Radioscopic imaging is approximately 1 minute. The system will start with default settings and a new patient. Reference images, subtraction masks, etc. must be remade. (It is not possible to display or use images from different patients.)

The operator may resume any aborted transfer in the transfer queue by opening the 'Transfer panel'. See section 5.17 'Standard DICOM package' for more details.

## 5.4 Using help and information

### 5.4.1 Information on the C-arm stand



- 1 If an error code occurs on the C-arm stand display, press the |Information| key [2] on the C-arm stand to display more information about the error message.

For more information see Section 6, 'System and error messages'.

### 5.4.2 Help on the mobile viewing station

The BV Libra is provided with a help function to assist the operator in using the system. This help function can be accessed using the |Help| key [23] on the mobile viewing station console. The help information is shown on the examination monitor.

- 1 Move the pointer to the item on which the information is required, for example:
  - buttons
  - field in a header line
  - fields in 'Patient administration', 'Dose report' or 'Set-up' pages.



- 2 Press the |Help| key [23] to display the help panel containing the information of the item where the pointer is located.



- 3 Move the pointer to the |Help| button and press the |Acc| key [36] to get information on how to use the help function.



- 4 Move the pointer to the |Index| button and press the |Acc| key [36] to get the help index.



- 5 A help text can cover more than one page.

Move the pointer to the |Previous| or |Next| button and press the |Acc| key [36] to display the previous or next page. If there is no previous or next page available the related button is greyed-out.

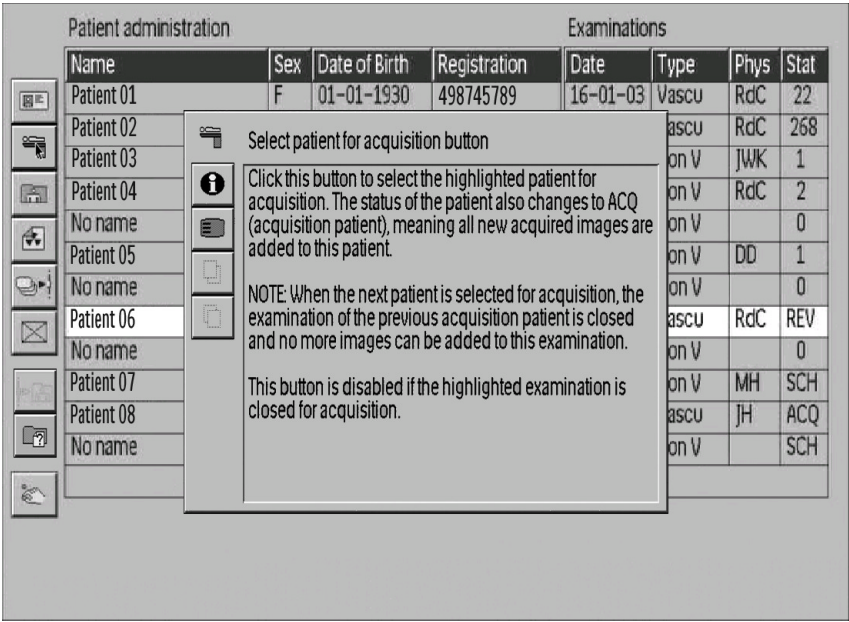


Figure 5.14 The help panel

- 6 To close the panel press the |Help| key again.

**NOTE** *If the help function is activated, information about other items can be obtained by moving the pointer to the item and pressing the |Acc| key [36].*

## 5.5 Entering patient and examination data

The 'Patient administration' screen is used to manage all data related to the patient and the examination. This includes handling (viewing, processing and archiving) the stored images, patient dose reports and set-up.



The 'Patient administration' screen is displayed immediately after start-up, but can be displayed during the examination or processing by pressing the [Patient administration] key [22].

### NOTE

**If the Password protection option is installed, a valid password must be entered before access to the patient list is granted.**

**Figure 5.15** Patient administration screen

Each line represents one examination. The fields in that line contain the following data.

Name in screen	Comment	Input
Name	The patient's name	This field has a maximum of 20 characters. If this field is changed later, all images of this examination will have this new data.
Sex	The patient's sex	Select from the list: Male, Female or Unknown. If this field is changed later, all images of this examination will have this new data.
Date of birth	The patient's date of birth	The date entered appears on all images of this examination. If this field is changed later, all images of this examination will have this new date.
Registration	The patient registration code	This field has a maximum of 12 characters. If this field is changed later, all images of this examination will have this new data.

Name in screen	Comment	Input
Date	Date of the examination	This field cannot be changed. The date appears when initiating fluoroscopy for the selected patient.
Type	The type of examination	Select from the list (see table below).
Phys	The performing physician	Select from the list. If this field is changed later, all images of this examination will have this new data. For editing the list see Section 3.2 'Set-up screen' in the BV Libra Instructions for Use.
Stat	The status of the examination	<p>Will change during the examination.</p> <p>The possible statuses are:  SCH: all the scheduled patients;  ACQ: this patient is selected for acquisition;  REV: this patient is selected for review;  &lt;number&gt;: an examination with the number of made images. When this field is dark grey, one or more images were sent to the local network.</p> <p>When a new patient is selected for acquisition, the previous examination is closed. No more images can be added to that examination.</p>

Examination type	Utilization
Vascular	The  Mode  switch [43] is enabled.
Non Vascular	The  Mode  switch [43] is disabled.



- 1 Move the pointer to the |Patient addition| button on the 'Patient administration' screen and press the |Acc| key [36]. The 'No name' field is selected.
- 2 Using the keyboard [21], enter the patient name and press the |Enter| key [21a]. The next field is selected.
- 3 Enter all the applicable data and accept it with the |Enter| key [21a].  
The newly entered patient gets the 'SCH' status. This means that the patient is scheduled.

Tips	
Enter data afterwards	It is not mandatory to enter patient data before the examination. The patient data can be entered (or changed) afterwards.
Change data	To change data afterwards, highlight the examination and select the field to be changed.
Navigate	Instead of using the  Enter  key, the  Tab  key will also navigate to the next field and  Shift + Tab  to previous field.
Select from a list	Use the trackball [34] to scroll through the items of the list and select one.
Delete data	If data is incorrect or mistyped use the  Backspace  key [21b] to delete the last character.
Special characters	<p>Special characters can be typed by holding down the  Comp  key [21c] and entering the first character. Release the  Comp  key [21c] and enter the second character.</p> <p>See Section 10.2 'Special characters' for a complete list of special characters.</p>

### 5.5.1 Selecting a patient for acquisition

- 1 If the required patient is not highlighted then move the pointer to the required patient from the list of patients with the status 'SCH', and press the |Acc| key [36].



- 2 Move the pointer to the |Select patient for acquisition| button and press the |Acc| key [36]. The patient's 'SCH' status is changed to 'ACQ' and the 'Patient administration' screen disappears.

All images made are added to this examination.

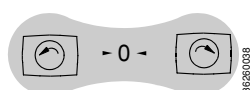
Tips	
Status	Only patients with the 'SCH' status can be selected for acquisition.
Acquire	It is also possible to make images without using the  Select patient for acquisition  button. The images made are stored under a new 'No name' examination.

## 5.6 Imaging essentials

The following functions can be applied during fluoroscopy or when the Last Image Hold (LIH) is displayed.

### 5.6.1 Rotate image

Rotate the image can be performed during fluoroscopy or when the Last Image Hold (LIH) is displayed.



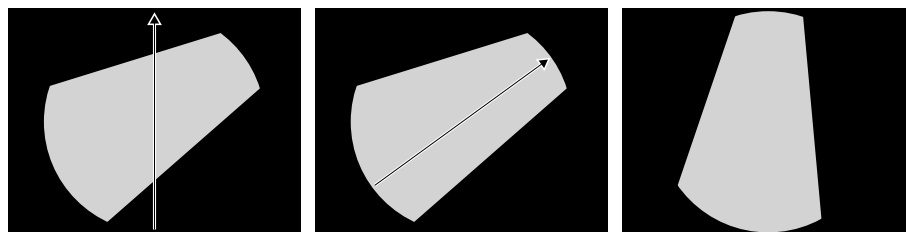
#### Rotation during fluoroscopy

- 1 During LDF fluoroscopy, use the |Rotate image| keys [7] to rotate the image.
- 2 To reset the image to the original position, press the |Reset image rotation| key [7a] for more than 0.5 second.

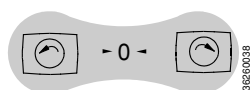
The new settings will be used for subsequent images.

#### Rotation at LIH

Rotation can also be performed at the LIH. Rotation is displayed schematically by an arrow indicating the top of the image after rotation.



**Figure 5.16** Rotation with LIH



- 1 Press either |Rotate image| key [7] to display an arrow on the image as displayed in Figure 5.13.
- 2 Use the |Rotate image| keys [7] to rotate the arrow to the point which should be the top of the image.
- 3 When performing fluoroscopy the image is rotated.
- 4 To reset the image to the original position, press the |Reset image rotation| key [7a] for more than 0.5 second.

The new settings will be used for subsequent images.

### 5.6.2 Scan reverse



- 1 To mirror an image, press the |Scan reverse| key [8], the LED beside the key is on, and perform fluoroscopy. The image is mirrored.
- 2 To restore the mirrored image, press the |Scan reverse| key [8] again.

The LED is off and the new settings will be used for subsequent images.

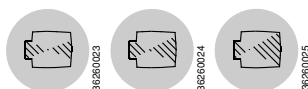
## 5.6.3

**Image Intensifier size****NOTE**

*The image intensifier size can only be changed when the 9" II is installed.*

There are three keys which corresponds with the following II size:

- small II format, the [9a] key
- middle II format, the [9b] key
- large II format, the [9c] key.



- 1 To change the image intensifier size, press one of the |II format| keys [9a], [9b] or [9c]. The LED next to the key is on and the format is displayed on the examination monitor for a few seconds.

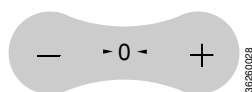
## 5.6.4

**Contrast and Brightness**

- 1 To adjust the contrast and brightness level, press the |Contrast/brightness| key [20a]. Use '–' for decrease and '+' to increase.

The new contrast and brightness is applied to all the images.

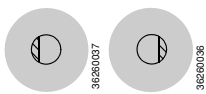
## 5.6.5

**Noise reduction**

- 1 To adjust the noise reduction level, press the 'Noise reduction' soft-keys [20]. Use '–' for decrease and '+' to increase.
- 2 To reset the noise reduction level, press the |Reset| soft-key [20] for more than 0.5 second.

5.6.6 Iris and shutter adjustments during fluoroscopy

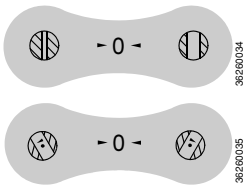
Shutter(s) adjustments



- 1 To adjust a shutter, press either the |Select left shutter| key [18] or |Select right shutter| key [17]. An LED next to the key is on.

Tip

Adjust both shutters To adjust both shutters together press the two keys simultaneously.



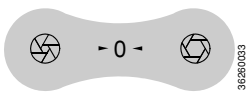
- 2 To move the shutter, press the |Move shutter(s)| key [15].
- 3 To rotate the shutter, press either the |Rotate shutter(s)| key [16].
- 4 To reset the shutter(s) movement, press the |Reset shutter(s) movement| key [15a] for more than 0.5 second.

The new settings will be used for subsequent images.

- 5 To reset the shutter(s) rotation, press the |Reset shutter(s) rotation| key [16a] for more than 0.5.

The new settings will be used for subsequent images.

Iris adjustment



- 1 To adjust the iris, press the |Move iris| key [14].
- 2 To reset the iris, press the |Reset iris| key [14a] for more than 0.5 second.

The new settings will be used for subsequent images.

### 5.6.7

## Iris and shutter adjustments on Last Image Hold (LIH)

On the LIH image two lines and a circle represents the shutters and iris as displayed in Figure 5.14. The selected one is marked with a block.

### Shutter(s) adjustments

- 1 To adjust a shutter, press either the |Select left shutter| key [18] or |Select right shutter| key [17]. An LED next to the key is on.

#### Tip

Adjust both shutters To adjust both shutters together press the two keys simultaneously.

- 2 To move the shutter, press the |Move shutters| key [15].
- 3 To rotate the shutter, press either the |Rotate shutters| key [16].  
The new settings will be used for subsequent images.
- 4 To reset the shutter(s) movement, press the |Reset shutter(s) movement| key [15a] for more than 0.5.  
The new settings will be used for subsequent images.
- 5 To reset the shutter(s) rotation, press the |Reset shutter(s) rotation| key [16a] for more than 0.5 second.  
The new settings will be used for subsequent images.

### Iris adjustment

- 1 To adjust the iris, press the |Move iris| key [14].  
The new settings will be used for subsequent images.
- 2 To reset the iris, press the |Reset iris| key [14a] for more than 0.5 second.  
The new settings will be used for subsequent images.

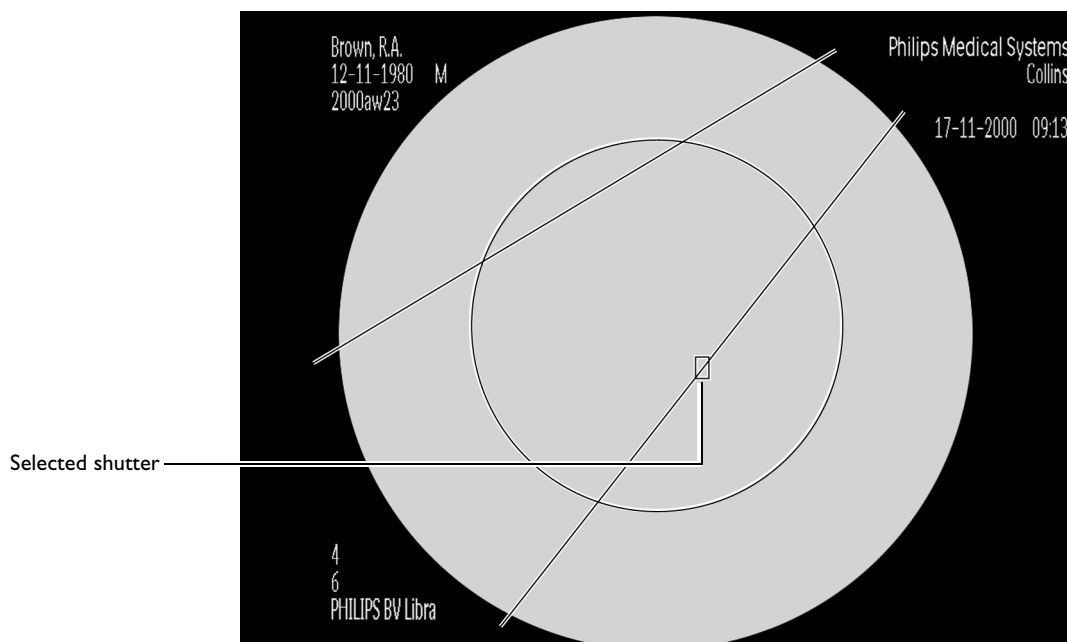
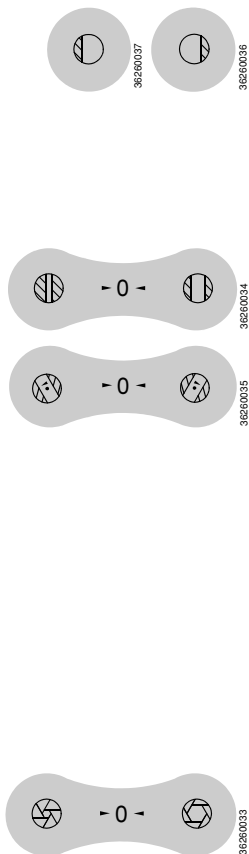


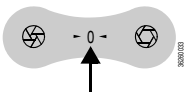
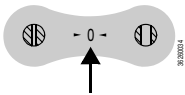
Figure 5.17 Iris and shutters adjustment on LIH

5.6.8 Automatic shutter positioning

The Automatic shutter positioning option (ASP) allows the operator to rapidly position shutters with a single key press on the C-arm stand console.

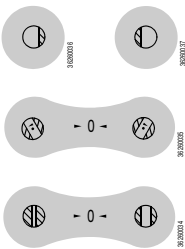
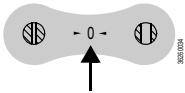
Collimating is most effective in the following conditions:

- reducing direct radiation
- in high-density examinations (above 55 kV).



NOTE

**ASP does not function if activated after the shutters or iris have been manually positioned. Always reset their positions before using ASP.**



NOTES

- 1 Reset the shutter positions by pressing the |Reset shutter(s) movement| key [15a] for at least 0.5 seconds.

The shutters are reset to their fully open positions.

- 2 Reset the iris position by pressing the |Reset iris| key [14a] for at least 0.5 seconds.

The iris is reset to its fully open position.

- 3 Acquire images, as desired.
- 4 With LIH displayed on the monitor, press the |Reset shutter(s) movement| key [15a] for at least 0.5 seconds to activate ASP.

Shutters are automatically positioned as visible on the LIH screen. The new shutter positions are used for subsequent images.

- 5 If required, fine-tune the final shutter positions manually:  
Select a shutter using the |Select right shutter| key [17] or |Select left shutter| key [18]
  - to rotate, press the |Rotate shutter(s)| key [16]
  - to move, press the |Move shutter(s)| key [15].

The new shutter positions are used for subsequent images.

- **If desired, the iris collimator can also be manually adjusted to fine-tune ASP results.**
- **If an optimum position cannot be found after activating ASP, the shutters remain in the reset position.**

Tips	
Reset shutter(s) movement  key [15a]	If the shutters or iris are already positioned, pressing the  Reset shutter(s) movement  key [15a] for at least 0.5 seconds resets them to their fully open position.
	If the shutters and iris are in their fully open position, pressing the  Reset shutter(s) movement  key [15a] for at least 0.5 seconds activates ASP.
	Pressing the  Reset shutter(s) movement  key [15a] for less than 0.5 seconds displays the current shutter positions without resetting them.

## 5.7 Monitor settings

The factory settings of the monitors are set for optimal image quality. The Automatic Brightness Control (ABC) sensor detects the ambient light level and will automatically adjust the brightness and contrast settings.



### WARNING

**Ensure that the X-ray on indicator is visible for all persons present in the operating room.**

### NOTE

**It is possible – but not recommended – to change the monitor's settings.**

Tips		
Adjust brightness and contrast	Before adjusting the brightness and contrast settings, please consult an image quality specialist.	
	User adjustment	Use the '+' and '-' keys to adjust brightness or contrast.
	Store user adjustment	To store a user preset, press both [Store] keys simultaneously. After storing, this setting can be recalled by pressing both [User] keys simultaneously.
	Recall default	To recall the default setting, press both [Ref] keys simultaneously.
Indicator LED	When the default settings are adjusted, the indicator LED will turn from green to red. When applying user settings, the indicator LED will turn yellow.	

### NOTE

**For the (optional) high end monitors and flat screen LCD monitors, the brightness and contrast controls are locked.**

### 5.7.1 Flat screen LCD monitors

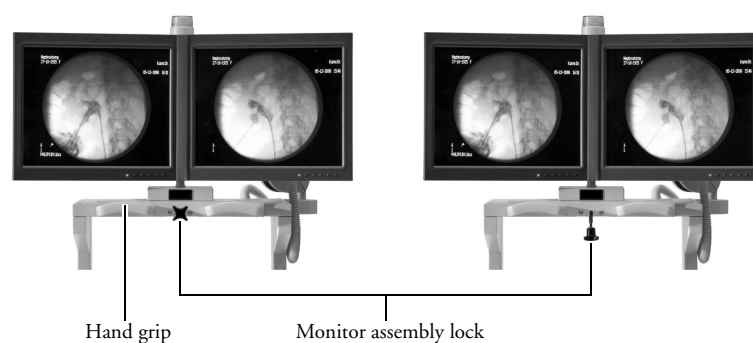
The flat screen TV monitors can be raised, lowered or pivoted for flexible positioning. Hand grips are provided for this purpose.



**Figure 5.18** Flat screen LCD monitors

#### LCD monitor assembly lock

The flat screen LCD monitor assembly can be locked to prevent accidental movement while the mobile viewing station is being transported. The monitor assembly can be unlocked when in use to allow the monitors to be repositioned.



**Figure 5.19** LCD monitor assembly lock: locked (left) and unlocked (right)



#### WARNINGS

- **Never use the carrier arm to position the flat screen LCD monitor assembly. There is a risk that fingers may be trapped! Use either of the hand grips on the monitor assembly to position the monitors.**
- **Ensure that the LCD monitor assembly swing arm is locked in the transport position before transporting the mobile viewing station.**

## 5.8 X-ray control

### 5.8.1 Automatic kV/mA control

By default the image brightness is controlled automatically by means of adaption of the kV and mA value. The unique patented BodySmart function instantly adapts the shape and size of the measuring field to the patient's relevant anatomy.

#### Tip

BodySmart

When there are dense objects in the X-ray beam (e.g. lead, metal), the control mechanism cannot function properly. Use manual kV/mA control.

### 5.8.2 Manual kV/mA control

For some projections and/or image contents (e.g. large metal objects) it may be necessary to override the automatic control with the manual control function.



- 1 Press the [Manual kV] key [1] to change to manual control.
- 2 Use the 'kV' soft-keys [20] to changes the kV value.  
The mA value is coupled to the kV value.
- 3 To switch back to automatic control, press the [Manual kV] key [1] again.

### 5.8.3 Automatic mA increase in LDF mode

This is also called High Penetration mode (HIP).

When the system is not able to produce a good image at the highest kV value, it will make an adjustment by means of a higher mA value. This function is fully automatic and controlled by the system. There is a time limitation of 20 seconds. After this time the system switches to 'normal' mA.

#### NOTE

*The dose value always remains within any limit set for local statutory regulations.*

### 5.8.4 Skin dose management

During prolonged intervention procedures skin dose levels can be high enough in normal use to cause a risk of deterministic effects. Risk management should be used to determine the risks and benefits for any given procedure. The BV Libra has several different selectable X-ray modes each producing different image quality by using different dose rates. The best X-ray mode for the procedure should be used.

For a 20 cm H<sub>2</sub>O phantom at 70 cm from focus:

IEC mode	X-ray mode	6" Dose rates [uGy/s]	9" Dose rates [uGy/s]
IEC Normal	Cont. LDF	111.0	70.1
IEC Low dose	½ dose LDF	55.2	35.0

See section 9.2.11 'Dose (rate)' for details of the dose rate or dose for a 20 cm H<sub>2</sub>O phantom at maximum kV and for all X-ray modes.

The maximum Radioscopy dose rate is 934 uGy/s at 70 cm from focus.

The 20 cm H<sub>2</sub>O phantom values are provided for the largest II format. For the middle II format the dose rate increases by 20% for a 12" system and 50% for a 9" system. The small II format the dose rate increases by 60% for a 12" system and 100% for a 9" system.

The interventional reference point is intended to be representative of the point of intersection of the X-ray beam axis and the patient. For this type of system, normal use for interventional procedures is with the C-arm vertical or horizontal and the patient as close to the II as possible. The interventional reference point is 30 cm from the II entrance surface or 69.5 cm from the focal spot. (Ref. IEC 60601-2-43.)

The error in estimating the total absorbed dose to the skin introduced from the defined point should average out as long as the procedure is composed of multiple views. Even under the worst case conditions, errors should be less than a factor of two. Of course, most of this error can be eliminated by assessing the position of the patient and calculating the appropriate correction factor. (Ref. IEC 60601-2-43.)

## 5.9 Making a Low Dose Fluoroscopy (LDF) image

Low dose fluoroscopy (LDF) image is recommended for C-arm (re)positioning and guiding purposes during catheterization procedures.



- 1 To make an LDF image, press either the left hand switch key [39] or the left pedal [41] of the foot switch.

The image is displayed on the examination monitor.

- 2 When the key of the hand switch [39] or the foot switch is released, X-ray is terminated and the last image remains displayed (Last Image Hold or LIH).

### Tip

Reset of fluoroscopy timer

When fluoroscopy is performed for more than five minutes a buzzer starts. Press the [Reset 5 minutes fluoroscopy] key [19] to switch off the buzzer. Fluoroscopy can continue. If the signal is not reset within 5 minutes, X-ray is disabled.

Dose reduction

See Section 5.10, 'Fluoroscopy modes' for information about dose reduction.

### NOTE

**When the storage speed is '0', the LIH is not stored on disk and will be overwritten by the next LIH.**

5.10

Making a High Definition Fluoroscopy (HDF) image

A High Definition Fluoroscopy (HDF) image can be made for archiving and/or high quality images.



- 1
- To make an HDF image, press either the right hand switch key [40] or the right pedal [42] of the foot switch.
- The image is displayed on the examination monitor.
- 2
- When the key of the hand switch [40] or the foot switch is released, X-ray is terminated and the last image remains displayed (Last Image Hold or LIH).

Tips	
Reset of fluoroscopy timer	When fluoroscopy is performed for more than five minutes a buzzer starts. Press the  Reset 5 minutes fluoroscopy  key [19] to switch off the buzzer. Fluoroscopy can continue. If the signal is not reset within 5 minutes, X-ray is disabled.
Dose reduction	See Section 5.10, 'Fluoroscopy modes' for information about dose reduction.
Storage frequency	To change the storage frequency, press the 'Store' soft-keys [20] to change the storage frequency.

NOTE

An HDF acquisition run is automatically terminated after 20 seconds.

## 5.11 Making vascular images

### NOTES

- *Vascular imaging is only possible when the 'Vascu' examination type is selected. See section 5.5 'Entering patient and examination data'.*
- *Switching between subtraction and normal fluoroscopy is possible by means of the foot switch.*

### 5.11.1 Performing subtraction

- 1 Press the middle pedal [43] of the foot switch to toggle to the 'Subtr' mode.

The mode is displayed in the lower-right corner of the monitor.

#### Tips

Storage frequency	To change the storage frequency, press the 'Store' soft-keys [20].
Image storage	Use HDF to store the subtracted run.
Blurred images	Do not move the system or patient during the subtraction procedure. This will result in blurred images.



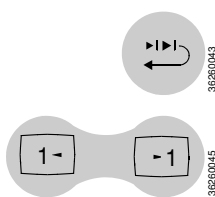
- 2 Press either the right key [40] on the hand switch or the right pedal [42] of the foot switch.

### NOTE

**Do not release the hand/foot switch until the subtraction run is completely finished. When the hand/foot switch is released, a new mask is made immediately after performing fluoroscopy again.**

After completion of the mask, the image is turned to grey and the message 'Inject' appears on the monitor.

- 3 Start injecting the contrast medium.  
Images of the contrast bolus will appear on the monitor.
- 4 Release the hand switch key [40] or the foot switch pedal [42] as soon as the contrast bolus has faded away.
- 5 To check the acquired images dynamically, press the |Run cycle| key [25].



- 6 To view individual images of the run, press the |Run cycle| key [25] again and use the |Previous image/run| key [33] or the |Next image/run| key [33].

#### Tips

Making corrections	To make corrections on a subtraction run, see section 5.11.2 'Remasking'.
--------------------	---

5.11.2

Remasking

By default the first image of a run is used as the mask. However, it is possible to use another image from the same run as a mask, e.g. an image closer to the start of the injection to provide better quality images for the entire subtraction run.

- 1
- Select the image to be the new mask.
- 2
- Switch off subtraction by pressing the |Remask| key [29].
- 3
- Switch on subtraction by pressing the |Remask| key [29].



Tip	
Remasking	It is easier to perform the remask procedure when the overview page is selected.

## 5.12 Fluoroscopy modes

There are three modes:

- continuous fluoroscopy.
- real pulsed fluoroscopy
- intermittent fluoroscopy

### 5.12.1 Continuous fluoroscopy

Continuous fluoroscopy produces high quality images for both static and dynamic images at normal dose using LDF or HDF.



- 1 To switch to continuous fluoroscopy, press the [X-mode Continuous] key [10].

### 5.12.2 Real pulsed fluoroscopy

The real pulsed fluoro mode is used for dynamic images using LDF or HDF with 12½ pulses per second (50 Hz). A dose reduction of 50% is realized.



- 1 To switch to real pulsed fluoro mode, press the [X-mode Real pulsed fluoro] key [11].

### 5.12.3 Intermittent fluoroscopy

Intermittent fluoroscopy is used for static images using LDF or HDF with 1 pulse per second. When this mode is used, a dose reduction is realized of 80%.



- 1 To switch to intermittent fluoroscopy, press the [X-mode Intermittent] key [12].

## 5.13 Performing radiography



### WARNING

*For 6" systems, the diameter of the X-ray field may exceed the edges of the primary protective shielding (the image intensifier container).  
(For HHS systems the radiography mode is disabled.)*

The radiography mode is used to make exposures on film.

- 1 Install the cassette holder and cassette. See Section 5.20.3, 'Installing the cassette holder' for more information.

A choice can be made between what is displayed on the monitor, with the shutter(s) and iris settings, or to use the cassette format.



- 2 To use the monitor settings, press the [Radiography] key [13] once. The left LED is on.

- or -

- 2 To use the 24 cm field, press the [Radiography] key [13] twice. The right LED is on.

- 3 Set the required kV and mAs values using the soft-keys [20].



- 4 Press the left key [39] of the hand switch and hold it until a beep indicates the end of the exposure.

## 5.14 Image review

### 5.14.1 Select an examination for review



- 1 If the 'Patient administration' page is not already displayed, press the |Patient administration| key [22].
- 2 The current patient is highlighted. Another patient can be selected by moving the pointer to the desired examination and pressing the |Acc| key [36].



- 3 Move the pointer to the |Select patient for review| button and press the |Acc| key [36].

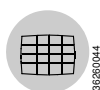
The last image of the last run of the selected examination is displayed on the examination monitor, all functions described in the previous paragraphs can be used now.

#### NOTES

- *When there are no stored images for the selected examination, the |Select patient for review| button is disabled.*
- *If the |Overview| key [26] is pressed when in the 'Patient administration' page the patient with the 'REV' status (not necessarily the highlighted patient) is displayed. When there is no patient with a 'REV' status an overview of the patient with the 'ACQ' status is displayed.*

### 5.14.2 Overview page

The overview function displays an overview of all the images (and all runs) of the selected examination in a 4 x 4 matrix.



- 1 To view the 'Overview' page of the selected examination, press the |Overview| key [26] on the mobile viewing station.

#### Tips

Select image	Use the  Previous/next image/run  keys [33] to navigate through the matrix. After the last image of the overview the selector will continue at the next overview page (or previous page when navigate backwards).  Alternatively use the trackball [34] to select the image.
View another page	When there is more than one page an indicator is displayed. Click the page indicator at the top-left (previous) or bottom-right (next) to go to the previous or next page.
Run overview	Pressing the  Overview  key [26] twice within 0.4 seconds will display all the middle images of all runs in one overview page.  To view images of the run, select the applicable run and press the  Overview  key [26]. The middle image of that run is displayed.

- 2 To enlarge the selected image, press the |Overview| key [26] again.

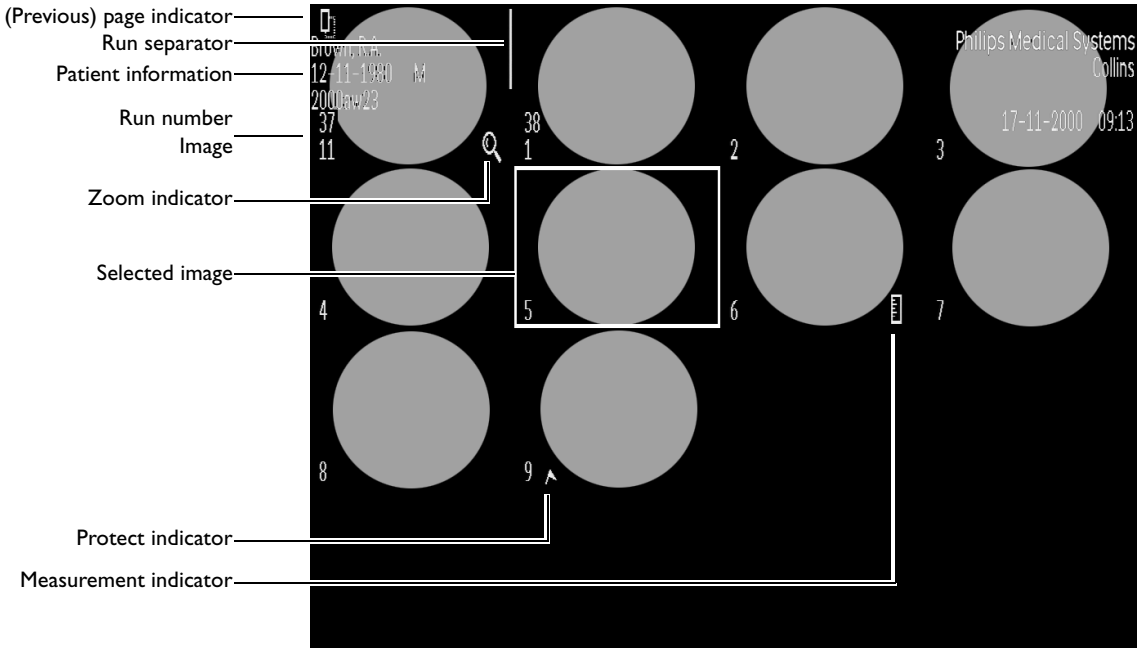
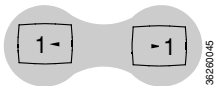


Figure 5.20    The overview page with indicators

5.14.3      **Single image review**



- 1    Use the |Previous/next image/run| keys [33] on the mobile viewing station to navigate through the images and runs one by one.

5.14.4      **Run cycle review**

**NOTE**      *The run cycle review function can only be used when a image storage disk is installed.*



- 1    To view the images of the run in a cycle, press the |Run cycle| key [25] on the mobile viewing station.

A symbol, similar to the one on the |Run cycle| key [25], is displayed on the lower-right corner of the monitor, indicating that the run cycle is active.

- 2    To stop the cycle press the |Run cycle| key [25] again.

Tips	
Viewing individual images	After stopping the run cycle, the  Previous/next image/run  keys [33] on the mobile viewing station allow viewing the individual images of that run.
Viewing runs	When the  Previous/next image/run  keys [33] on the mobile viewing station are pressed during a run cycle the older or newer runs are displayed.

5.14.5 Dose report



- 1 If the ‘Patient administration’ page is not already displayed, press the |Patient administration| key [22].
- 2 Move the pointer to the relevant examination and press the |Acc| key [36].
- 3 Move the pointer to the |Dose report| button and press the |Acc| key [36].



A report as shown below is displayed.

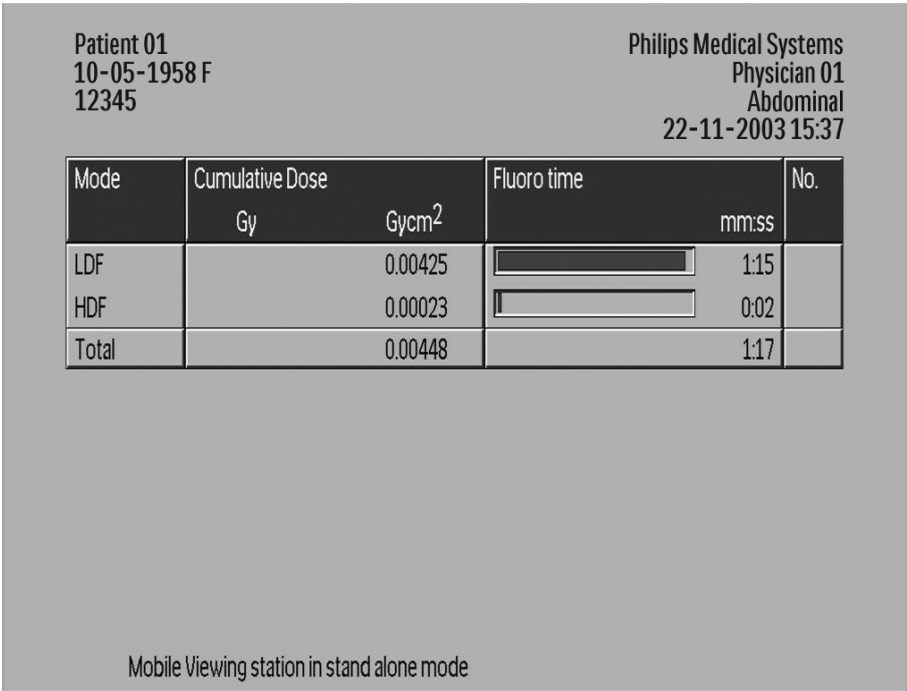


Figure 5.21 Dose report screen

Tip	
Print	If a printer is installed a copy of the report can be made by pressing the  Print  key [3] on the C-arm stand or the  Print  key on the printer.
Export	<p>If the Standard DICOM package option is installed, the dose report can be exported or printed to the hospital/department network.</p> <p>See section 5.17 ‘Standard DICOM package’ for details about exporting or printing the dose report to a network device.</p>

### 5.14.6 Reviewing other examinations during acquisition

During the current acquisition, images of a previous examination can be viewed.



- 1 If the 'Patient administration' page is not already displayed, press the |Patient administration| key [22].
- 2 Move the pointer to the desired examination and press the |Acc| key [36].  
A confirmation to close the current acquisition patient is displayed.
- 3 Move the pointer to the |Yes| button and press the |Acc| key [36] to close the current acquisition patient. No more images can be added for this examination.

- or -

- 3 Move the pointer to the |No| button and press the |Acc| key [36] to not close the current acquisition patient. It is possible to add images to this examination.



- 4 Move the pointer to the |Select patient for review| button and press the |Acc| key [36].

The last image of the last run of the selected examination is displayed on the examination monitor, all functions described in the previous paragraphs can be used now.

### 5.14.7 Delete a complete examination

#### CAUTION

**Deleting an examination can NOT be undone.**



- 1 If the 'Patient administration' page is not already displayed, press the |Patient administration| key [22].
- 2 Move the pointer to the examination to be deleted and press the |Acc| key [36].



- 3 Move the pointer to the |Delete| button and press the |Acc| key [36].

- or -



- 3 Press the |Delete| key [21b].  
A confirmation to delete the selected examination is displayed.
- 4 Move the pointer to the |OK| button and press the |Acc| key [36] to delete the complete examination.

- or -

- 4 Move the pointer to the |Cancel| button and press the |Acc| key [36] to cancel deletion and return to the 'Patient administration' page.

## 5.15 Protection and image storage management

The protect flag can be attached to an image for storage management purposes. Protected images will not be overwritten during the examination.

### 5.15.1 Protecting an image



- 1 Select the image to be protected as described in the previous chapters.
- 2 To protect the image, press the [Protect] key [6] on the C-arm stand or [30] on the mobile viewing station.

A protect indicator (a flag) is displayed on the lower-left corner of the protected image.

- 3 To protect the complete run, press the [Protect] key [6] on the C-arm stand or [30] on the mobile viewing station during a run cycle.

#### Tips

Protect images	During the patient's examination, protected images will never be overwritten.
Print and export	Print or export images as soon as possible. When an examination is closed, protected images can be overwritten without warning.
Unprotect images	If images/runs are protected, press the [Protect] key on the mobile viewing station [24] to remove the 'Protect' status.

### Image storage management

Images are stored on a disk in the system. It is possible to protect images against overwriting.

The space on the disk that cannot be protected is preconfigured; this ensures a minimum working area. At the start of a new examination the working area is available for new images.

Total available memory			
Working area		Protected area	
Unprotected images of older examinations can be overwritten without warning	Unprotected images of the current examination will be overwritten after the clock symbol	Protected images of older examinations can be overwritten without warning	Protected images of the current examination cannot be overwritten

**Figure 5.22** Overview of image storage management

At the start of a new examination, the working area (unprotected images) is available for new images.

#### CAUTION

**Unprotected images of previous examinations will be overwritten without warning.**



When the unprotected working area is full with new images, the oldest of the new images will be overwritten. Before this happens a clock symbol appears on the screen together with the imaging time (seconds) that is still available.

CAUTION

*The clock symbol, displayed with an amount of time in seconds, indicates that images of the current examination are going to be overwritten.*



In order to avoid overwriting, it is possible to protect images. When new images are protected, they cannot be overwritten during the current examination.

CAUTION

*When the disk is full with protected images, protected images of previous examinations will be overwritten without warning.*

Tips	
Enlarging the working area directly	If the overwrite warning clock appears the working area can be enlarged immediately by protecting runs or images.  (Protected images of previous examinations will be deleted.)
Enlarging the working area before the examination	The working area can be enlarged by deleting older (protected) examinations.  It is good practice to delete examinations when they are no longer needed.
Maximum run size	The maximum number of images in one run is 999. If this number is exceeded, the first images will be overwritten. Before this happens the warning clock will appear, together with the remaining time before the overwriting begins.
Intended use	The preconfigured working area run buffer that cannot be protected (see Section 3.3 'Customizing'), together with the image storage management method described above, ensures that sufficient storage space is always available.

NOTES

- *Clinical reference images for constancy tests will be overwritten when the disk is full.*
- *The maximum length of one run is 999, therefore the run time (before overwriting begins) is also limited.*

No indication of the available storage capacity is given before the start of a run. For each run the number of images that can be stored is the complete working area up to a maximum of 999 images. With the larger disk options, this will allow a complete run to be stored at maximum fr/sec.

Runs that require more than 999 images to be stored are considered outside the normal use of this equipment.

5.15.2

**Parking/protecting an image to the reference monitor**



- 1 Press the [Park] key on either the C-arm stand [5] or the mobile viewing station [26].

The image on the examination monitor is copied to the reference monitor.

NOTE

*The parked image is automatically protected.*

## 5.16 Printing and recording (optional)

### 5.16.1 Printing images on paper or transparency film

A print can be made of what is displayed on the examination monitor.

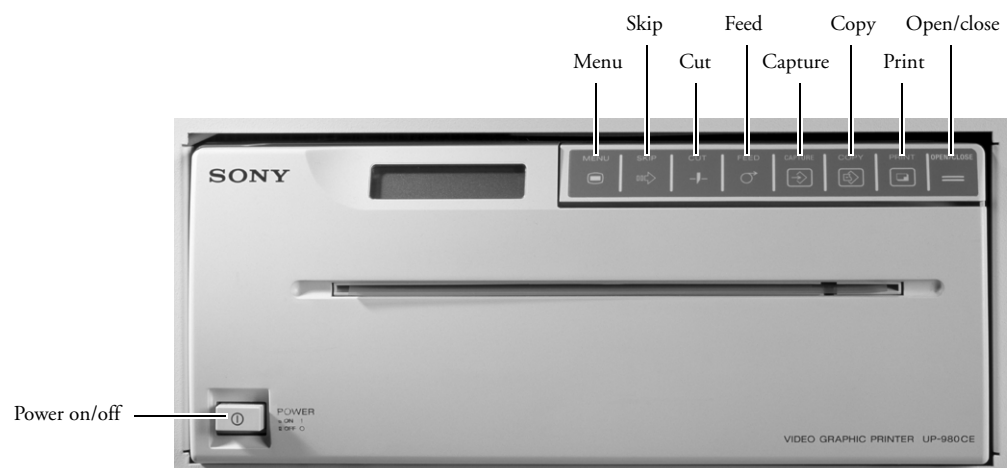
- 1 Make sure the printer is switched on and contains paper/transparency.
- 2 In case of an image, select the desired image as described in the previous chapters.
- or -
- 2 In case of a dose report, select the desired examination type as described in Section 5.13.5, 'Dose report'.
- 3 Print the image by pressing the appropriate button on the printer.

For full instructions on using printers, refer to the printer's user manual.

The use of printing paper/transparency film types other than those specified in the printer's user manual may result in diminished printer performance and poor print quality.

#### CAUTIONS

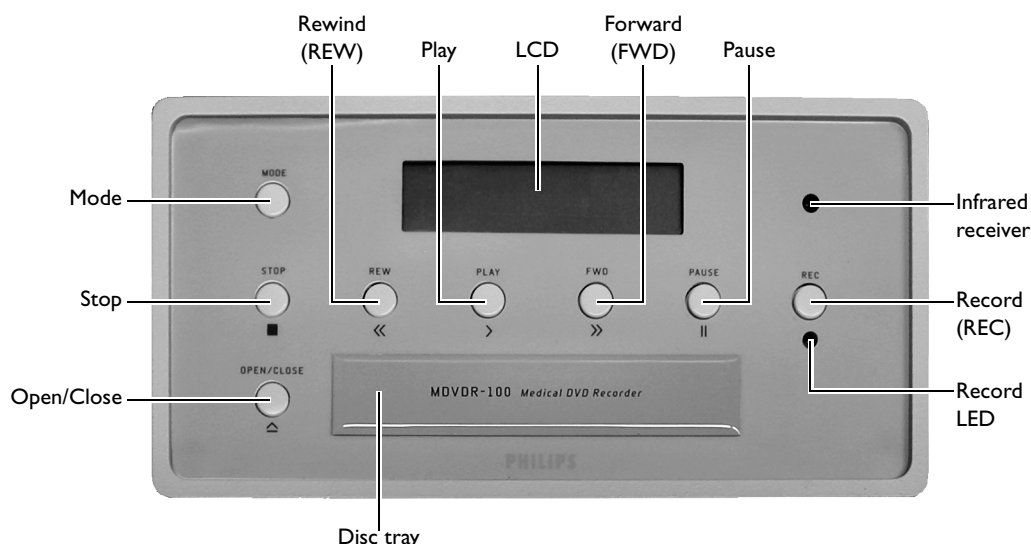
- **Do not leave unused or printed paper/transparency in hot or humid places.**
- **Do not leave paper/transparency in a place subject to direct sunlight or bright room light for an extended period of time.**
- **Store unused or printed paper/transparency in a cool, dark place (below 30°C / 86°F), preferably in a polypropylene pouch.**
- **Do not stack printed paper/transparency on or under a freshly-developed diazo copy sheet.**
- **Do not allow any volatile organic solvent or vinyl chloride to contact the paper/transparency.**
- **Alcohol, plastic tape or film will fade the printout. Attach printed paper to other pieces of paper with double sided plastic tape or water-based solid glue.**



**Figure 5.23** Paper and transparency printer

### 5.16.2 Recording images on DVD

The Medical DVD Recorder (MDVDR) option provides storage of images on DVDs. Both static and dynamic images can be recorded. The MDVDR records in DVD+RW format, allowing further recordings to be added to a disc at a later date.



**Figure 5.24** Medical DVD Recorder (MDVDR)

For more information, see the Operator's Manual for the MDVDR-100 Series Medical DVD Recorder (Perkins Electronics).

#### Recording images

Images can be recorded automatically during fluoroscopy, or runs can be selected on the mobile viewing station and recorded manually. In both cases, to ensure successful recording, it is highly recommended to observe the following guidelines for preparation before recording.

#### Preparing for recording

The MDVDR is switched on automatically when the mobile viewing station is switched on. It does not need to be switched on manually by the operator.

- 1 Press the [OPEN/CLOSE] button on the MDVDR to open the disc tray.
- 2 Insert a disc to use for recording.

**NOTE** Only DVD+RW discs can be used with the MDVDR.

- 3 Press the [OPEN/CLOSE] button again to close the disc tray.

- NOTES**
- If using a new disc, the disc will require formatting before it can be used for recording. Inserting a new disc in the MDVDR automatically formats new discs. This process takes about 20 seconds. Images cannot be recorded while formatting is in progress, as indicated by the status message 'FORMATTING DISC' in the LCD.
  - If recording images on an existing (formatted) disc, check that there is sufficient space on the disc. To view free disc space, check the final title in the Title menu; the final title is always reserved for information about disc usage, and displays the percentage of free space available on the disc. See the section 'Replaying images' below for details about selecting titles.

- 4 Wait until the MDVDR is in standby mode, as indicated by the status message 'STANDBY DVD' in the LCD.

The operator can now start recording, either in automatic mode, or manual mode.

#### **Automatic recording**

Automatic recording is activated automatically by fluoroscopy, and allows the operator to record images while concentrating on the examination. The automatic recording function must be enabled by Service during installation.

#### **NOTES**

- *If the BV system is setup for automatic recording (depending on the examination type and the installation settings), the MDVDR starts and stops recording automatically.*
- *Ensure that the preparation guidelines (above) have been followed before recording.*

- 1 Start fluoroscopy.

The MDVDR automatically starts recording the fluoroscopy images on the left monitor of the mobile viewing station.

The status message 'RECORD ON FSW' appears in the LCD, along with the elapsed recording time.

The Record LED is lit.

#### **NOTE**

*If |Video replay| [25] is on, it is automatically turned off when fluoroscopy is started.*

- 2 Stop fluoroscopy.

The MDVDR pauses recording, and the status message 'RECORD PAUSE FSW' appears in the LCD.

At this point, two options are available to the operator:

- To continue recording, start fluoroscopy again.
  - The MDVDR automatically starts recording again.
  - The status message 'RECORD ON FSW' appears in the LCD, along with the elapsed recording time, the remaining recording time and the total number of chapters on the disc. The continued recording will be stored as a new chapter under the same title.
- or -
- To finish recording, press the |STOP| button on the MDVDR.
  - The status message 'PLEASE WAIT' appears in the LCD while the recording is finalized.
  - After finalizing, the recording is available as a new title on the disc.
  - The MDVDR returns to standby mode, as indicated by the status message 'STANDBY DVD' in the LCD.

#### **NOTE**

*Recording can be paused and restarted with fluoroscopy any number of times (up to the capacity limit of the disc) before finalizing the recording.*

#### **CAUTION**

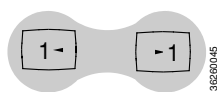
*It is essential to finalize the recording by pressing the |STOP| button on the MDVDR after recording has been completed, otherwise the recording will be lost if the mobile viewing station is subsequently switched off.*

**Manual recording**

Manual recording allows the operator to select and display stored images, and record the images to disc.

**NOTE**

**Ensure that the preparation guidelines (above) have been followed before recording.**



- 1 Use the [Previous/next image/run] keys [27] to display the image to be recorded on the left monitor of the mobile viewing station.
- 2 Press the [REC] button on the MDVDR.

The MDVDR starts recording the image on the left monitor.

The status message 'RECORD ON MAN' appears in the LCD, along with the elapsed recording time.

The Record LED is lit.



- 3 Press the [Run Cycle] key [19] to start displaying the run.

While the run is playing on the left monitor, it is recorded to disc.

At this point two options are available to the operator:

- To record another run, press the [PAUSE] button on the MDVDR.
  - The status message 'RECORD PAUSE MAN' appears in the LCD.
  - Select another image using the [Previous/next image/run] keys [27].
  - Press the [PAUSE] button again on the MDVDR to continue recording.
  - The status message 'RECORD ON MAN' appears in the LCD, along with the, elapsed recording time, the remaining recording time and the total number of chapters on the disc. The continued recording will be stored as a new chapter under the same title.
- or -
- To finish recording, press the [STOP] button on the MDVDR.
  - The status message 'PLEASE WAIT' appears in the LCD while the recording is finalized.
  - After finalizing, the recording is available as a new title on the disc.
  - The MDVDR returns to standby mode, as indicated by the status message 'STANDBY DVD' in the LCD.

**NOTES**

- **Recording can be paused and restarted any number of times (up to the capacity limit of the disc) before finalizing the recording.**
- **In case of short runs, the chapter number is not updated. Short live runs are placed in one chapter.**

**CAUTION**

**It is essential to finalize the recording by pressing the [STOP] button on the MDVDR after recording has been completed, otherwise the recording will be lost if the mobile viewing station is subsequently switched off.**

Tips	
Pre-formatted discs	It is recommended to have some pre-formatted discs always in stock prior to an examination. This avoids the automatic 20 second formatting delay.
Maximum chapters per disc	A maximum of 125 chapters is permitted per disc, across all titles, with a limit of 99 chapters in a single title. If this maximum is reached the MDVDR automatically finalizes the current recorded title.
Maximum titles per disc	A maximum of 48 titles is permitted per disc.  When a disc limit is reached, the status message 'DISC FULL' appears in the LCD and no further recordings can be made. To continue recording, use another disc with sufficient space.
One disc per patient	It recommended to reserve each disc for a single patient to simplify management of recorded images.
Record after the examination is finished	It is recommended to record images immediately after the actual examination is finished.
Always finalize recordings on the disc	After recording, always finalize the recording on the disc by pressing the [STOP] button on the MDVDR. If a recording is not finalized, recorded data may be lost.
LCD messages	It can take several seconds before the LCD is updated after the activation of some functions on the MDVDR.
Error status messages	Press the [STOP] button on the MDVDR to clear error status messages from the LCD after taking appropriate action.

### Replaying images

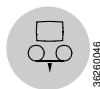
Discs containing recorded images can be replayed using the MDVDR, and viewed on the left monitor of the mobile viewing station.

- 1 Press the [OPEN/CLOSE] button on the MDVDR to open the disc tray.
- 2 Insert a disc with recorded images to use for playback.
- 3 Press the [OPEN/CLOSE] button again to close the disc tray.
- 4 Ensure that [Video replay] [25] is active on the mobile viewing station; the LED next to the [Video replay] key [25] is lit when it is active.
- 5 Wait until the status message 'STANDBY DVD' is displayed in the LCD.
- 6 Press the [PLAY] button on the MDVDR to activate the Title menu.

The Title menu displays a list of all the titles recorded on the disc. Each title is displayed with the first image of the recording, along with the date, time and length of the recording.

- 7 Select the title to be viewed:
  - press the [FWD] button to move down the list of titles
  - press the [REW] button to move up the list.
- 8 Press the [PLAY] button to play the selected title.

The recorded images are displayed on the left monitor of the mobile viewing station.



36E60046

- 9 If desired, press the [PAUSE] button to pause playback.

'PLAY PAUSE' is displayed in the LCD.

- Press the [PAUSE] button again while playback is paused to advance the paused display to the next image
- Press the [PLAY] button to resume playback.

At the end of the title, playback returns to the Title menu.

#### NOTE

**Alternatively, discs recorded on the MDVDR can be replayed on a standard PC or DVD player. When using a PC to replay discs, a DVD media player application such as WinDVD, for example, is required.**

#### Replay speed selection

The operator can change the speed and direction of playback using a rewind and forward wind function. Playback can be changed to speeds ranging from x1/16 to x100 in either direction.

- 1 Ensure playback is progress. Images can only be forward wound or rewound while a chapter is being played.
- 2 Press the [MODE] button on the MDVDR to change the playback mode.

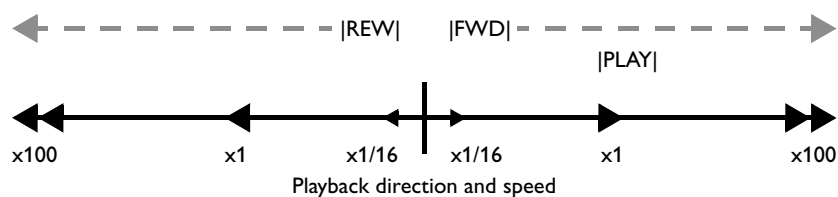
Pressing the [MODE] button during playback alternates between modes. Press the [MODE] button repeatedly until the desired mode is displayed in the LCD: 'FWD/REWIND MODE'.

When FWD/REWIND mode is active:

- press the [FWD] button to increase the forward playback speed
- press the [REW] button to increase the reverse playback speed

#### NOTES

- **Pressing the [REW] button while forward playback is in progress changes the direction to reverse playback at x1/16 speed, and vice versa.**
- **After either button is pressed, the current playback direction and speed is displayed on the left monitor.**
- press the [PLAY] button at any time to quickly return to forward playback at normal speed (x1).



**Figure 5.25** Replay speed selection

**NEXT/PREV mode**

NEXT/PREV mode allows the operator to move quickly forward and backward between chapters on the disc.

- 1 Ensure playback is progress. NEXT/PREV mode can only be activated while a chapter is being played.
- 2 Press the [MODE] button on the MDVDR to change the playback mode.

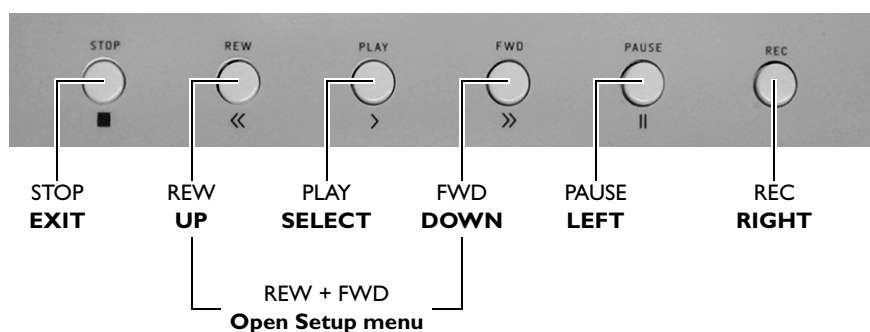
Pressing the [MODE] button during playback alternates between modes. Press the [MODE] button repeatedly until the desired mode is displayed in the LCD: 'NEXT/PREV MODE'.

When NEXT/PREV mode is active:

- press the [FWD] button to move the playback to the next chapter
- press the [REW] button to move the playback to the previous chapter.

**MDVDR configuration**

Some functions on the MDVDR require access to a Setup menu. Buttons on the MDVDR are used to open, navigate, select and close the Setup menu, which is displayed on the left monitor. The following figure shows the secondary functions of the relevant buttons, for use in the Setup menu.



**Figure 5.26** Using the MDVDR buttons to navigate the Setup menu

The Setup menu is used for the following procedures:

- Erasing discs
- Setting the date and time on the MDVDR.

**Erasing discs****CAUTION**

*Erasing a disc erases all data from the disc. Titles cannot be erased individually.*

- 1 Press the [OPEN/CLOSE] button on the MDVDR to open the disc tray.
- 2 Insert a disc to be erased.
- 3 Press the [OPEN/CLOSE] button again to close the disc tray.
- 4 Ensure that [Video replay] [25] is active on the mobile viewing station; the LED next to the [Video replay] key [25] is lit when it is active.
- 5 Wait until the status message 'STANDBY DVD' is displayed in the LCD.
- 6 On the MDVDR, press the [REW] and the [FWD] buttons simultaneously. The status message 'SETUP RECORDER' is displayed in the LCD.
- 7 Press the [PLAY] button to display the 'SETUP>SYSTEM' menu on the examination monitor.



36260046

**NOTE**

See Figure 5.26 above for assistance with navigating the Setup menu.

- 8 Press the [FWD] button to switch to the 'SETUP>DISC' menu.  
The option 'Erase DVD' appears in the 'SETUP>DISC' menu.
- 9 Press the [REC] button to display the 'START' function.
- 10 Press the [REC] button again to highlight the 'START' function.
- 11 Press the [PLAY] button to display the 'FORMAT DISC' function, and the options 'Yes' and 'No'. By default the option 'No' is selected.
- 12 Press the [PAUSE] button to highlight the option 'Yes'.
- 13 Press the [PLAY] button to complete the action and erase the disc.  
A bar is displayed in the 'SETUP>DISC' menu to indicate progress.
- 14 When the disc has been erased, press the [STOP] button to close the 'SETUP>SYSTEM' menu.
- 15 The MDVDR automatically ejects the disc after erasing it. Press the [OPEN / CLOSE] button on the MDVDR to close the disc tray.
- 16 Wait until the status message 'STANDBY DVD' is displayed in the LCD.  
The MDVDR is now ready to record images on the erased disc.

#### **Setting the date and time on the MDVDR**



- 1 Ensure that [Video replay] [25] is active on the mobile viewing station; the LED next to the [Video replay] key [25] is lit when it is active.
- 2 On the MDVDR, press the [REW] and the [FWD] buttons simultaneously.  
The status message 'SETUP RECORDER' is displayed in the LCD.
- 3 Press the [PLAY] button to display the 'SETUP>SYSTEM' menu on the left monitor.  
'Set Time' is the first option in the 'SETUP>SYSTEM' menu.

**NOTE**      **See Figure 5.26    above for assistance with navigating the Setup menu.**

- 4 Press the [REC] button to display the 'Manual' function for the 'Set Time' option.
- 5 Press the [REC] button again to highlight the 'Manual' function.
- 6 Press the [PLAY] button to start setting the date and time:  
The date is displayed as MM/DD/YY, followed by the time displayed as HH:MM.

**NOTE**      **The MDVDR uses the 24-hour clock format.**

To change an item, press the [REW] and [FWD] buttons to increase or decrease the value.

To move to another item, press the [PAUSE] and [REC] buttons to highlight the next or previous item.

- 7 Choose to either 'Save' or 'Cancel' the settings:  
Use the [PAUSE] or [REC] buttons to highlight the desired option.
- 8 Press the [PLAY] button to save the changes, or cancel them, depending on the option highlighted in the previous step.
- 9 When the changes have been saved or cancelled, press the [STOP] button to close the 'SETUP>SYSTEM' menu.

## 5.17 Standard DICOM package

The Standard DICOM package option allows examination images and dose reports to be sent to the hospital/department network for storage or printing.

### 5.17.1 Selecting DICOM export tasks

- 1 On the 'Patient administration' page select the examination to be stored or printed.



- 2 Click the |Export patient| button.

The 'Export panel' is displayed.

Name	Patient ID	Accession number
Patient 01	12345	A12345

Target	Type
Dryview 8900	PRINT
DRYPRO 752	PRINT
DRIEPRO 771	PRINT

Image format
Secondary Capture with text (SC)

Image selection: ☐ All images ☐ Protected images ☐ Current image ☐ No images

Nr. Images: 7

Page format: ☐ 1 x 1 - 1 ☐ 2 x 1 - 2 ☐ 2 x 2 - 4

Nr. Pages: 7

☒ Include Dose Report

Cancel Resume OK

**Figure 5.27** Export panel

- 3 If required, enter an Accession number for the selected patient in the 'Accession Number' field.

#### NOTE

**The 'Name' and 'Patient ID' fields cannot be modified.**

- 4 Select the required network device from the 'Target' list.

A target may be either a store target or a print target. The 'Type' column in the 'Target' list indicates what kind of network device each target is.

- 5 Select the required format from the 'Image Format' list.

The following formats are available:

Image format	Use
XA	Viewing and post-processing on workstations (raw non-processed images).
SC (with text)	Printing and archiving.
SC (without text)	Used for target devices which cannot handle patient data on the image.

#### NOTE

**Printing is restricted to the 'SC (with text)' image format.**

- 6 Select which images to store or print from the 'Image Selection' list.

After making a selection, the number of images that will be stored or printed is shown to the right of the 'Image Selection' list.

**NOTE** *The setting 'No Images' can be used in conjunction with the 'Include Dose Report' checkbox when only a dose report is required for store or printing.*

- 7 Select the required page layout from the 'Page Format' list. This step is only necessary when printing. Otherwise, continue with step 8.

The options in the 'Page Format' list indicate columns × rows, and the total number of images per page.

**NOTE** *Not all printers support all page layout options. The actual options supported by available printers on the network can be configured by Service.*

After making a selection, the number of pages that will be printed is shown to the right of the 'Page Format' list.

- 8 If a dose report is required, check the 'Include Dose Report' checkbox.
- 9 When all settings are correct, click the [OK] button.

The images and/or dose report appear briefly on the screen as they are queued for transfer to the DICOM network.

#### NOTES



- *It is possible to cancel the selection while images and/or a dose report are displayed on the screen (during queueing for transfer). This can be done by pressing the [Patient administration] key, or by starting fluoroscopy with the hand switch or foot switch. Pressing the [Patient administration] key requires the operator to confirm the cancel action, but starting fluoroscopy does not. Cancelling the selection during queueing for transfer deletes it from the queue. If required, it must be selected and queued again manually.*
- *Clicking the [Cancel] button in the 'Export panel' prior to queueing also cancels the selection without saving it to the queue. In this case the 'Export panel' is closed and the 'Patient administration' page is displayed.*
- *To indicate that an examination has been sent to the queue, the associated entry in the 'Stat' column on the 'Patient administration' page is greyed, although this does not necessarily mean the images have been transferred.*

#### Tips

Starting fluoro	Do not start fluoro or perform other actions during queueing, otherwise the export has to be started again.
Storing or printing a dose report without images	To store or print a dose report on its own, select 'No Images' in the 'Image Selection' list, check the 'Include Dose Report' checkbox and click the [OK] button.
Export settings	The last used network device ('target') is automatically selected at the start of the next session to assist with configuring tasks. The operator can accept this target or select a alternative (if available) for the current task. Additionally, the settings last used with each target are stored for the next task. The operator can amend the settings if required.

#### Next steps...

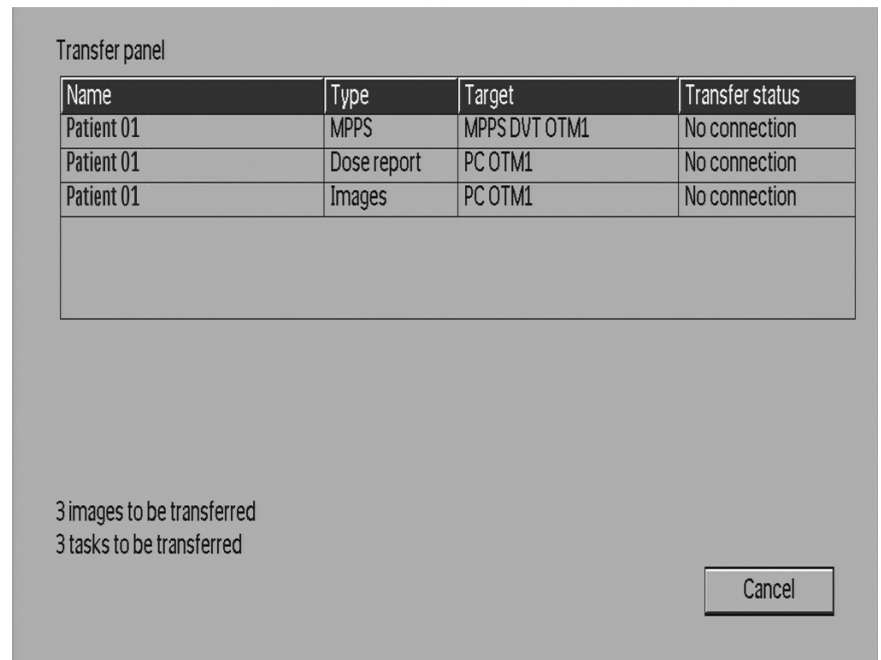
- see section 5.17.2 below if the BV Libra is online
- see section 5.17.3 below if the BV Libra is offline.

### 5.17.2 Online transfer tasks

After completing the selection steps described in the previous section, the ‘Transfer panel’ is displayed providing information about the transfer progress. Any queued tasks that have not yet been stored or printed are also transferred at this time and appear in the ‘Transfer’ list.

#### NOTE

**The transfer queue is ordered by date and time, with the most recent store or print task at the top of the queue. The queueing order cannot be changed.**



**Figure 5.28** Transfer panel

The ‘Transfer panel’ displays all store and print tasks in the queue, along with their target network device and current transfer status.

At any stage of the transfer, clicking on a task in the list provides more information about the task; details of the selected task appear below the transfer list.

As each task is transferred to the appropriate network device (specified in the ‘Target’ column), the ‘Transfer Status’ column displays which tasks have been transferred and which are queued, awaiting transfer. For the task currently being transferred, it displays how many images of the total have been transferred.

A summary of the total transfer progress appears at the bottom of the page, providing details of how many images and patients remain to be transferred.

The ‘Transfer Status’ column also indicates whether a transfer task has encountered an error. If an error is reported, click on the task to show more information about the error and guidance on resolving it. Errors are specific to a task and may not prevent subsequent tasks from being transferred; when an error is reported, the system continues with the next task in the queue.

When all transfer tasks are completed, the ‘Transfer panel’ remains visible to display the status of the transferred tasks: whether transferred successfully, or whether an error was encountered. To close the ‘Transfer panel’, click the [Cancel] button. When the ‘Transfer panel’ is closed, successfully completed tasks are removed from the queue.

Cancelling the transfer operation

The transfer operation can be interrupted at any time, in case the BV Libra is required for acquisition in an emergency. Cancelling the transfer operation will not result in the loss of any tasks. The task that is currently being transferred is cancelled and held in the queue, to be restarted during the next transfer operation. All queued tasks awaiting transfer also remain in the queue for the next transfer operation. Tasks that were transferred successfully prior to cancelling are removed from the queue.

To cancel the transfer operation perform one of the following actions:

- Click the ‘Cancel’ button in the ‘Transfer panel’. The transfer operation is cancelled and the ‘Patient administration’ page is displayed.
- Press the |Patient administration| key. The operator is required to confirm this action before the transfer operation is cancelled.
- Start acquiring fluoroscopy images using the hand switch or the foot switch.



Tip	
Starting fluoro	Do not start fluoro or perform other actions during transfer to the network, otherwise the transfer has to be resumed (from the Export panel).

5.17.3 Working offline

After completing the selection steps described in section 5.17.1 ‘Selecting DICOM export tasks’, the store or print task is saved on the system in a queue. There is no further action and the display returns to the ‘Patient administration’ page. Queued tasks are held on the system for deferred store or print when the BV Libra comes online at a later stage.

Exporting queued images and/or dose reports

- 1 Reconnect the BV Libra to the hospital/department network.
- 2 Click the |Export patient| button in the ‘Patient administration’ page.



The ‘Export panel’ is displayed. The details of the selected patient appear, but they can be ignored if a store or print task for this patient is not required at this time. Continue directly with the next step.

- 3 Click the |Resume| button to initiate the transfer of queued tasks.

The ‘Transfer panel’ is displayed and the transfer of queued tasks begins. See section 5.17.2 above for details of the ‘Transfer panel’ and transfer progress.

NOTES

- *The |Export patient| button is always enabled in the ‘Patient administration’ page. This allows the operator to access queued store and print tasks from previous examinations.*
- *Selecting a new store or print task also initiates transfer of any queued tasks stored during a previous offline session.*

Tip	
Checking the transfer task queue	The transfer task queue can be checked at any time (online or offline) by clicking the  Resume  button in the ‘Export panel’.

## 5.18 Advanced DICOM package

The Advanced DICOM package provides an extended set of features for communicating with DICOM services on the hospital/department network. The following services are available:

- Worklist management  
Query a Worklist management (WLM) server and receive scheduled patient data
- Modality Performed Procedure Step (MPPS)  
Send MPPS data for enhanced progress reporting
- Storage commit  
View the Storage commit status of images sent to a network storage device.

### 5.18.1 Querying the Worklist management server

Querying the WLM server on the hospital/department network allows the mobile viewing station to receive details of scheduled patients stored on the server.

The connection settings to the WLM server are configured by Service at installation.



- 1 On the Patient administration panel, click the |Get worklist| button.

All scheduled patients are received from the WLM server and are displayed in the Patient administration panel.

#### NOTE

**The system must be online to receive scheduled patient data from the WLM server.**



- 2 To view complete details of a scheduled patient received from the WLM server, select the patient in the Patient administration panel and click the |Worklist review| button.

Modality Worklist Review

Attribute	Value
	TEST02-CPTTEST02-1234
Date of Birth	05-02-1966
Patient Sex	Female
Patient Weight	45.0 kg
Other Patient Names	Patient 01^Susan Mary Madonna^van^Rev.^Ph.D.
Image Service Request	
Accession Number	1234567890123456
Referring Physician	Bone^John Peter^^Dr.^M.D.
Scheduled Procedure Step	
Start date	05-02-2004
Start time	11:17
Procedure Step Description	This is the Scheduled Procedure Description with max characters1

Close

Figure 5.29 Modality worklist review panel

The Worklist review panel is displayed, providing the following information:

Patient	
Patient	Patient's full name
Patient ID	Primary hospital identification number or code for the patient
Date of Birth	Date of birth of the named patient
Patient Sex	Sex of the named patient
Patient Weight	Weight of the patient in kilograms
Other Patient Names	Other names used to identify the patient
Image Service Request	
Accession Number	A RIS generated number that identifies the order for the Study
Referring Physician	Patient's primary referring physician for this visit
Scheduled Procedure Step	
Start date	Date on which the Scheduled Procedure Step is scheduled to start.
Start time	Date at which the Scheduled Procedure Step is scheduled to start.
Procedure Step Description	Institution-generated description or classification of the Scheduled Procedure Step to be performed.
Requested Contrast Agent	Contrast agent requested for use in the Scheduled Procedure Step.
Pre-Medication	Medication to be administered at the beginning of the Scheduled Procedure Step.
Modality	The BV Family system
Location	The location at which the Procedure Step is scheduled to be performed.
Requested Procedure	
Requested Procedure ID	Identifies the Requested Procedure in the Image Service Request.
Req. Procedure Description	Institution-generated administrative description or classification of Requested Procedure.
Patient Medical	
Medical Alerts	Conditions to which medical staff should be alerted.
Contrast Allergies	Description of prior reaction to contrast agents.
Special Needs	Medical and social needs.

#### NOTES

- *The Worklist review panel can be used to view a patient's special needs or allergies, or to confirm the identity of a patient in case of similarity.*
- *The Worklist review panel can only be displayed for patients received from the WLM server.*

- 3 Click the 'Close' button to close the Worklist review panel.

### Managing patient data received from the WLM server

Only the 'Type' and 'Physician' fields of scheduled patient received from the WLM server can be edited. All other field are read only. This is to allow for differences that may arise between the Scheduled Physician and the Performing Physician.

**NOTE** *The Scheduled Physician is the physician specified on the WLM server. If the Scheduled Physician is not included in the list of Physicians on the mobile viewing station when the scheduled patient data is received, the Physician field is left empty. The name of the Performing Physician can then be entered by the operator.*

### Receiving updates from the WLM server

Clicking the [Get worklist] button again updates the patient list with new scheduled patients and changes to existing scheduled patients already received on the mobile viewing station.

**NOTES**

- *The WLM update is a one-way process. The WLM server updates the mobile viewing station, but not vice versa.*
- *No automatic updates are performed. All updates are initiated by clicking the [Get worklist] button.*

Clicking the [Get worklist] button also removes scheduled patients from the mobile viewing station that have been removed from the WLM server.

**NOTE** *A patient for whom images have been acquired will not be removed from the system after performing a WLM server update, even if the entry has been removed from the WLM server. This is to allow acquired images to be exported.*

### Configuring the WLM server query

The query sent to the WLM server can be refined to focus the list on specific scheduled patients. Four different queries are available, matching various attributes of the following WLM server parameters:

- Modality type
- Scheduled Station AE Title
- Scheduled Station Name
- Scheduled Procedure Step Start date.

For example, a query can be created to retrieve all patients scheduled for the current date and assigned to a particular mobile viewing station.

**NOTES**

- *Only one query can be assigned to the [Get worklist] button at any one time.*
- *Consult Service, or an appropriate member of hospital staff, to change the query.*

### Exporting patient data received from the WLM server


When exporting images of a scheduled patient received from the WLM server, certain data imported from the hospital/department network are included. See the DICOM Conformance Statement for details.

5.18.2 Sending MPPS data with examinations

MPPS data can be sent to the hospital/department network to report the status of an examination. MPPS data provides details of the protocol, the physician and technologist. This information can then be used for reporting purposes.

To use MPPS, it must be enabled on the system, and an MPPS target must be configured. This can be done either by Service, or by an appropriate hospital staff member.

MPPS is integrated with the Export function (see x-ref - standard dicom), and is accessed via an additional Performed Procedure Step panel.

- 
- 1

In the Patient administration panel select the examination to be exported.
- 2

Click the |Export patient| button to open the Export panel.
- 3

After completing the Export selections appropriately, click the |OK & MPPS| button to open the Performed Procedure Step panel.

Performed Procedure Step

Name	Patient ID	Accession number	Performing Physician
Patient01	12345	A12345	Johnson

Protocol Name

Ortho

Vasc

No name

Performing Technologist

Franklin

Williams

No name

Cancel

Completed

Discontinued

Figure 5.30 Performed Procedure Step panel

The following fields cannot be edited in the MPPS panel:

- Name
- Patient ID
- Accession Number
- Performing Physician

NOTE

*If the wrong Physician is displayed, it can be changed in the Patient administration panel.*

- 4

Select the correct Protocol from the list (mandatory).

If the required protocol is not listed, select the ‘no name’ entry and enter the new protocol name (maximum 50 characters).
- 5

Select the Performing Technologist from the list, if required (optional).

If the required name is not listed, select the ‘no name’ entry and enter the new technologist’s name (maximum 50 characters).

**NOTE** *New Protocol and Performing Technologist entries are registered in the system even if the current MPPS task is cancelled.*

- 6 Select the appropriate MPPS status button:
  - Click the |Completed| button to send the patient data to the configured Export target, and the 'Completed' status to the MPPS server.
  - Click the |Discontinued| button to send the patient data to the configured Export target, and the 'Discontinued' status to the MPPS server.

After clicking the |Completed| button or the |Discontinued| button, the Transfer panel appears. The Type column indicates the type of data for each transfer. The possible transfer types are 'MPPS', 'Dose Report' or 'Images'. See x-ref - online store and print for information about the Transfer panel.

- Clicking the |Cancel| button cancels the MPPS action without sending the MPPS status to the hospital/department network. After cancelling, the Export panel is displayed.

### 5.18.3 Viewing Storage commit status of images

Storage commit provides feedback on the status of images sent to the hospital/department network. The operator can view this status in the Transfer panel, and receive confirmation that images sent to a storage device have been archived.

**NOTE** *The Storage commit feature can be enabled or disabled for each storage target. This can be done either by Service, or by an appropriate hospital staff member.*

- 1 If the Transfer panel is not shown, open it by clicking the |Resume| button in the Export panel.

**NOTE** *The system must be online to view the Transfer panel.*

- 2 In the Transfer panel, check the Transfer status of exported images:
  - 'Not committed' means a storage commit request has been sent, but the images have not yet been committed to the archive of the storage device. The length of time required to archive the images may vary, depending on the archive schedule of the storage target.
- 3 The entry remains in the Transfer list of the Transfer panel until the storage target commits the images to the archive.

**NOTE** *Although the 'Not committed' entry remains in the Transfer list, the examination is only sent once.*

- 4 The entry is automatically removed from the Transfer list when the storage commit is successfully completed.

## 5.19 ViewForum surgical workstation

The ViewForum surgical workstation is independent from the BV mobile C-arm system, and is controlled using a separate keyboard and mouse. However, the ViewForum surgical workstation shares the right monitor of the mobile viewing station with the BV Libra. This allows the operator to view reference images from a PACS alongside the live image from the BV Libra.

### NOTES

- *The operator can switch the right monitor display between the BV Libra and the ViewForum surgical workstation using the ViewForum surgical workstation keyboard. All procedures for using the ViewForum surgical workstation are described in this section.*
- *The ViewForum surgical workstation option is only available for BV Libra systems equipped with color LCD monitors.*

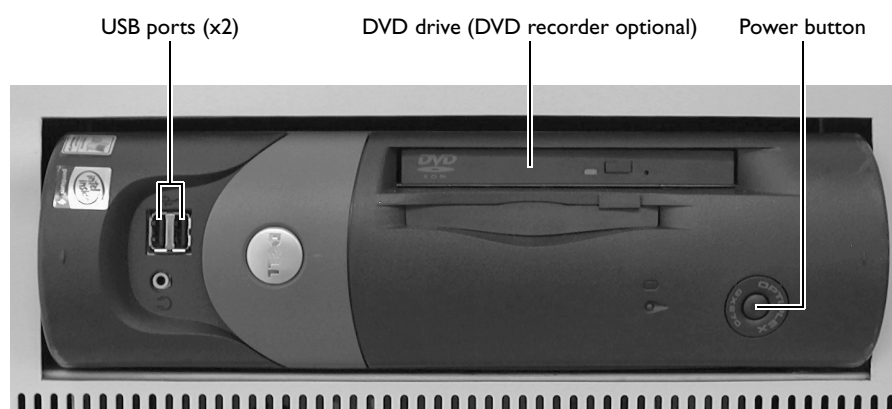


Figure 5.31 ViewForum surgical workstation

### 5.19.1 Switching on the ViewForum surgical workstation

The ViewForum surgical workstation is independent from the BV Libra and is not switched on automatically with the BV Libra. To use the ViewForum surgical workstation, the operator must switch it on explicitly.

#### How to switch on the ViewForum surgical workstation

- 1 Ensure the mobile viewing station is switched on.
- 2 Press the power button of the ViewForum surgical workstation PC located at the back of the mobile viewing station.

The ViewForum surgical workstation starts up and the Windows XP log on screen is displayed on the right monitor.

If the log on screen is not visible, ensure the right monitor is switched to display ViewForum surgical workstation (see below for details).

How to switch the image source on the right monitor

The ViewForum surgical workstation shares the right monitor with the BV Libra. The operator can either view the BV reference images on the right monitor (i.e. the parked image) or the ViewForum image.

Switching between the two systems is managed using a key sequence on the ViewForum surgical workstation keyboard. A sticker explaining the key sequence is placed on the mobile viewing station as a reminder.

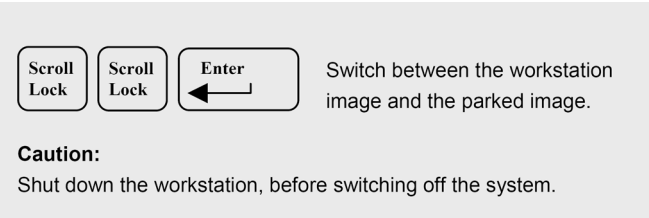


Figure 5.32 Monitor switch key sequence sticker

- 1
- To switch the image on the right monitor, press the following keys on the ViewForum surgical workstation keyboard in sequence:
- Scroll Lock
  - Scroll Lock
  - Enter

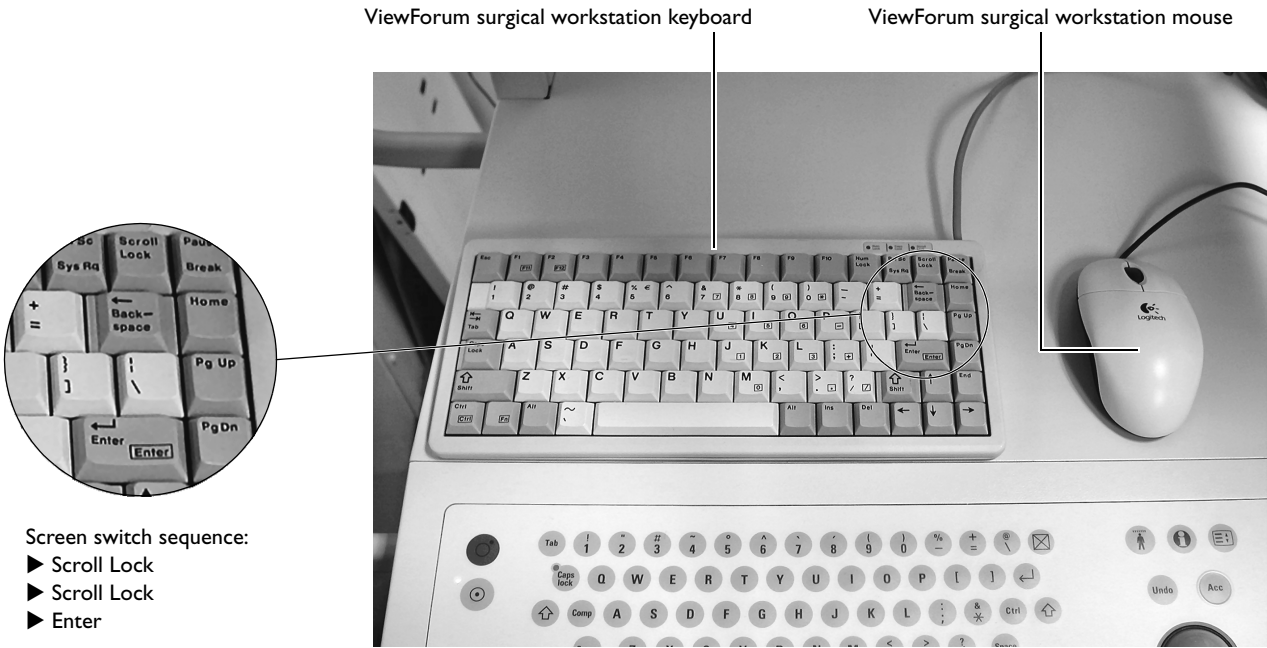


Figure 5.33 ViewForum surgical workstation keyboard and mouse

- 2
- To switch the right monitor back, repeat the key sequence (above).

NOTES

- *The image cannot be switched from the mobile viewing station console.*
- *Switching the display between the two systems does not affect the current function in either display.*
- *The left monitor is reserved solely for the BV Libra.*

### 5.19.2 Logging on to the ViewForum surgical workstation

When the ViewForum surgical workstation starts, the Windows XP operating system log on screen is displayed (ensure the right monitor is switched to correct display).

To log on to the ViewForum surgical workstation, the operator must:

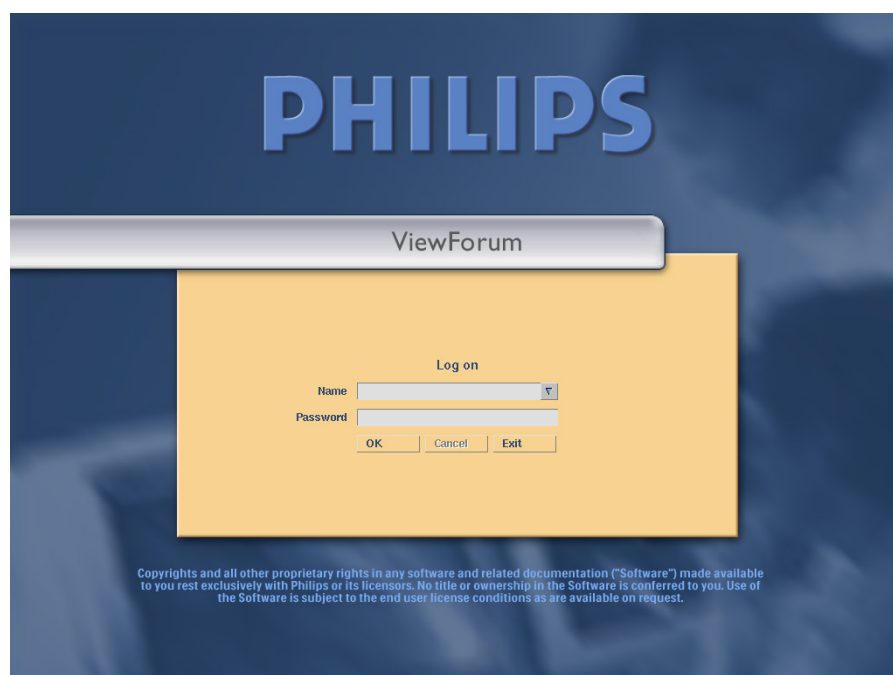
- log on to the operating system
- start the ViewForum surgical workstation application
- log on to ViewForum.

#### How to log on the operating system

- 1 At the log on screen, select the user 'VFUser'.
- 2 At the password prompt, enter the following password:  
ViewUser1
- 3 Click 'OK' to log on.

#### How to log on to the ViewForum surgical workstation

- 1 After logging on the operating system, double-click the 'ViewForum' icon.  
The ViewForum surgical workstation log on screen is displayed.



**Figure 5.34** ViewForum surgical workstation log on screen

- 2 Select the username 'Surgery user' from the Name field drop-down menu.
- 3 Click the OK button to log on.

**NOTE** *The 'Surgery user' username does not require a password.*

ViewForum surgical workstation starts, ready for use. The ViewForum surgical workstation option on the BV Libra is pre-configured for surgical use and is adapted to the needs of the surgical user.

### 5.19.3 Logging off the ViewForum surgical workstation

If ViewForum surgical workstation is not displayed on the right monitor, use the screen switch key sequence to view the workstation display (see above for details).

#### How to log off the ViewForum surgical workstation

- 1 Click 'Session' in the menu bar to open the Session menu.
- 2 Select the 'Log off' menu item from the Session menu.

The current session is closed and the user is logged off. The log in screen appears, ready for another operator to log in.

- 3 If desired, click the 'Exit' button to close the ViewForum application on the workstation.

Alternatively:

- 1 Click 'Session' in the menu bar to open the Session menu.
- 2 Select the 'Exit' menu item from the Session menu.

The current user is logged off and the ViewForum surgical workstation application is closed.

### 5.19.4 Switching off the ViewForum surgical workstation

Ensure the ViewForum application is closed using the How to log off the ViewForum surgical workstation procedure described above.

#### How to switch off the ViewForum surgical workstation

- 1 Click the |start| button in the Windows® XP taskbar.

The 'start' menu appears.

- 2 Click the |Shut Down| button in the 'start' menu.

The 'Shut Down Windows' dialog appears.

- 3 Select 'Shut down' from the drop down menu.
- 4 Click the |OK| button.

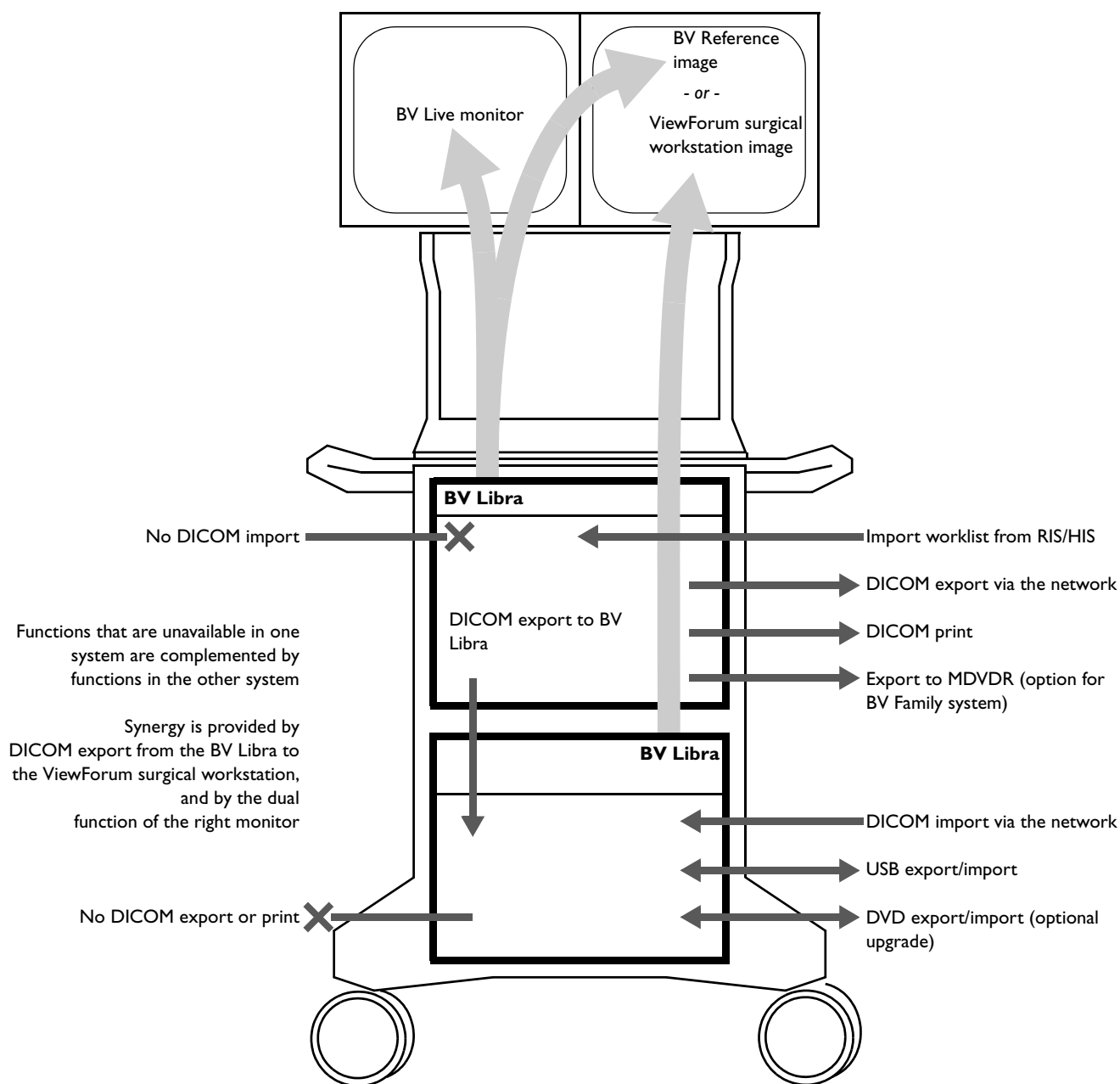
The ViewForum surgical workstation shuts down and switches off automatically.

#### CAUTION

**While the mobile viewing station |System on| key [D] does not switch on the ViewForum surgical workstation, the |System off| key [C] removes power to the entire mobile viewing station, including the ViewForum surgical workstation. To avoid data loss, always switch off the ViewForum surgical workstation before switching off the mobile viewing station. Use the methods described above to ensure safe shut down.**

### 5.19.5 Exporting data to and from the ViewForum surgical workstation

There are several export and import functions available with the BV Libra in combination with the ViewForum surgical workstation:



**Figure 5.35** Export and import scenarios

#### Retrieving images from a PACS

Acquired images can be retrieved from the network. These images can be used for:

- pre-operative planning before acquiring runs with the BV Libra
- intra-operative side-by-side comparison with live images as they are acquired with the BV Libra.

To retrieve images from the network to the ViewForum surgical workstation, use the 'Query and retrieve' procedure described in the ViewForum Instructions For Use supplied with the ViewForum surgical workstation.

## Sending images to the ViewForum surgical workstation

**NOTE** To send images to the ViewForum from the BV Libra, the 'Standard DICOM package' option is required. Details of this option are contained in the Instructions For Use for the BV Libra.

The ViewForum surgical workstation is configured by Service as a 'target' within the DICOM export option on the BV Libra.

To send images to the ViewForum surgical workstation from the BV Libra, follow the procedure in section 5.17 'Standard DICOM package' of the BV Libra Instructions For Use.

### Overview of workflow

The combination of the BV Libra and the ViewForum surgical workstation is suited to the following workflow:

Pre-operative	
Get worklist and patient data	Use DICOM import on the BV Libra to import patient data from RIS/HIS
Get pre-operative images for surgical planning	Use Query and retrieve on the ViewForum surgical workstation to import images from a PACS - or - Use the ViewForum surgical workstation to retrieve from DICOM CD
Intra-operative	
Acquire images	Acquire images using the BV Libra
Compare acquired images with pre-operative images	Switch to ViewForum surgical workstation on right display to view acquired images and pre-operative reference images side-by-side
Post-operative	
Send acquired images to HIS/RIS (PACS)	Use DICOM export on the BV Libra to export runs to RIS/HIS
Print acquired images	Use DICOM print on the BV Libra
Reporting (option)	Use DICOM export on the BV Libra to export runs to ViewForum surgical workstation
Personal archive or transfer	Use ViewForum surgical workstation to copy images to a USB storage device - or - Use ViewForum surgical workstation to copy runs to a DICOM DVD (optional upgrade)

### 5.19.6 Exporting images to USB or DVD

Images can be exported from the ViewForum surgical workstation to a personal storage device. The ViewForum surgical workstation supports the following devices:

- USB memory stick or other USB storage device
  - export of single images in PNG format
  - export of reports in Microsoft Word format
- DVD (option)
  - export of runs (fully compliant DICOM export).

#### NOTES

- **Export to USB is a standard function of the ViewForum surgical workstation. However, storage devices (e.g. memory stick) are not supplied.**
- **Export to DVD is an optional upgrade that replaces the standard DVD drive with a recordable DVD drive.**

#### How to export an image to a USB storage device

Ensure a USB storage device is connected to the ViewForum surgical workstation and is correctly configured.

- 1 Select the image to be exported.
- 2 Select the 'Copy' menu item from the 'Folder' menu.  
The Copy dialog opens.
- 3 Select 'PNG File Format' from the To field using the drop-down menu.
- 4 In the Destination field, type the correct drive letter and file path to the desired location on the USB storage device.

#### NOTE

**Drive letter designations may vary. It is the responsibility of the operator to ascertain the correct drive letter and file path.**

- 5 Click the OK button to copy the selected image to the USB storage device.

#### How to export images to the DVD recorder

#### NOTES

- **The DVD recorder is an optional upgrade to the ViewForum surgical workstation. The DVD drive supplied as standard cannot record images to DVD.**
- **For full details about using the DVD recorder, refer to the ViewForum Workstation Instructions For Use.**

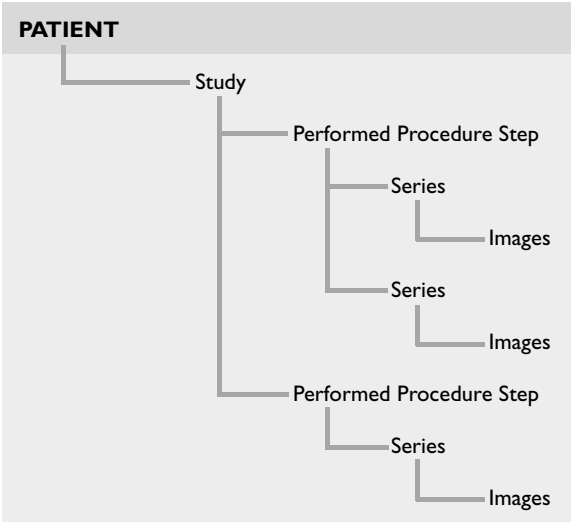
- 1 Insert a recordable DVD in the DVD drive.
- 2 Select the run to be exported.
- 3 Select the 'Copy' menu item from the 'Folder' menu.  
The Copy dialog opens.
- 4 Select 'DVD Recordable drive' from the To field using the drop-down menu.
- 5 Click the OK button to record the selected run to DVD.

5.19.7Quick-start guide

This section provides a overview of basic procedures and function buttons to help the surgical user get started with the ViewForum surgical workstation.

Patient navigation











On the ViewForum surgical workstation, patient data is organised as follows:








Controls

The following tables provide an overview of the main controls available in the ViewForum surgical workstation:









Function buttons

Button	Function		
	Refresh		Show exam level
	Query active		Copy to...
	Query		Delete
	Open/close folder		View/edit attributes
	Show patient level		Database space information

Toolbar

Buttons	Function
	Patient navigation
	Screen arrangement: <ul style="list-style-type: none"><li>- tile view</li><li>- tab view</li><li>- display protocols</li><li>- reset to default</li></ul>
	Save presentation states
	Zoom
	Full screen

Direct mouse manipulation

Action		Function	Cursor
Click left mouse button		Select	
Click middle mouse button		Deselect	
Click right mouse button		Open quick menu	
Drag left mouse button		Scroll	
Drag middle mouse button		WW/WL	
Drag middle and right mouse button		Zoom	
Drag left and middle mouse button		Pan	

### Transferring images

There are four main scenarios for transferring images to and from the ViewForum surgical workstation:

Source		Destination	Console	Notes
BV Libra	➡	ViewForum surgical workstation	Use DICOM export on the BV mobile viewing station	• Requires Standard DICOM package option for BV Family
PACS	➡	ViewForum surgical workstation	Use 'Query and retrieve' on the ViewForum surgical workstation	• Refer to the ViewForum Instructions For Use for details
		ViewForum surgical workstation ➡ USB	<ul style="list-style-type: none"> <li>• Select an image</li> <li>• Use the Copy menu item in the Folder menu</li> </ul>	<ul style="list-style-type: none"> <li>• For transfer of single images only</li> <li>• User must supply USB storage media</li> </ul>
		ViewForum surgical workstation ➡ DICOM DVD	<ul style="list-style-type: none"> <li>• Select a run</li> <li>• Use the Copy menu item in the Folder menu</li> </ul>	<ul style="list-style-type: none"> <li>• For transfer of runs in DICOM format</li> <li>• Requires DVD Recorder option for the ViewForum surgical workstation</li> </ul>

These transfers are described in more detail in the following section.

#### NOTE

**Export to the PACS from the ViewForum surgical workstation is not required; images imported to the workstation are generally retrieved from a PACS, and are therefore already stored on the RIS/HIS. Images imported to the ViewForum surgical workstation directly from the BV Libra should be exported to the PACS from the BV Libra itself using DICOM export.**

## 5.20 Post-processing images

The functions are activated with buttons on the mobile viewing station screen.



- 1 Select the image to be processed and press the [Post-processing] key [24].

Some of the post-processing buttons displayed have a sub-menu as shown below.

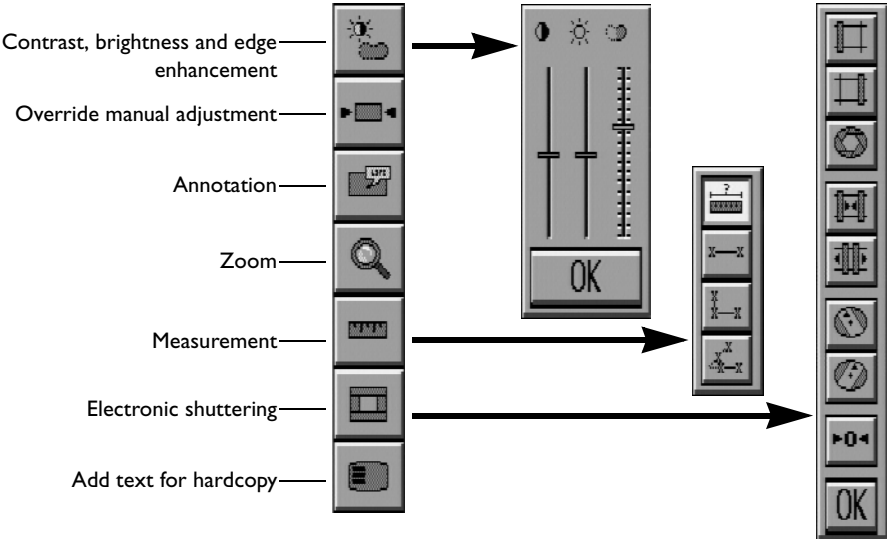


Figure 5.36 Post-processing functions

## 5.20.1

**Contrast, Brightness and Edge enhancement (optional)**

The 'Contrast, Brightness and Edge enhancement' (CBE) changes are only applicable on the visible image.

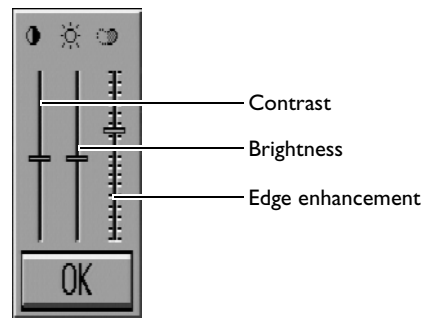
When the settings are applied, they stay valid for viewing even when the mobile viewing station is restarted. When applied to an image of a run, the original settings are applied to that image during run cycle.



- 1 Move the pointer to the [CBE] button and press the [Acc] key [36]. The control panel appears.
- 2 Move the pointer to one of the sliders and press the [Acc] key [36].
- 3 Use the trackball [34] to move the slider to the desired position, press the [Acc] key [36].

Move the slider up to increase, move it down to decrease. The settings are immediately applied to the image.

- 4 When all changes are made, move the pointer to the [OK] button and press the [Acc] key [36] to confirm the changes.



**Figure 5.37** Contrast, brightness and edge enhancement control panel

## 5.20.2

**Override manual adjustments (optional)**

The 'Override manual adjustments' function will undo the manually made changes to the contrast, brightness and edge enhancement settings and re-applies the default settings.

**NOTE**

***This function cannot be undone.***



- 1 Move the pointer to the [Override manual adjustment] button and press the [Acc] key [36].

The default CBE changes are applied.

**Tip**

Use of the [CB] key      Adjustments made with the [Contrast/brightness] key [20a] of the C-arm stand or [27] of the mobile viewing station are not affected with this override.

5.20.3 Annotation (optional)

With the ‘Annotation’ function one remark can be added to the current image. The text field and the pointer can be positioned anywhere in the image.

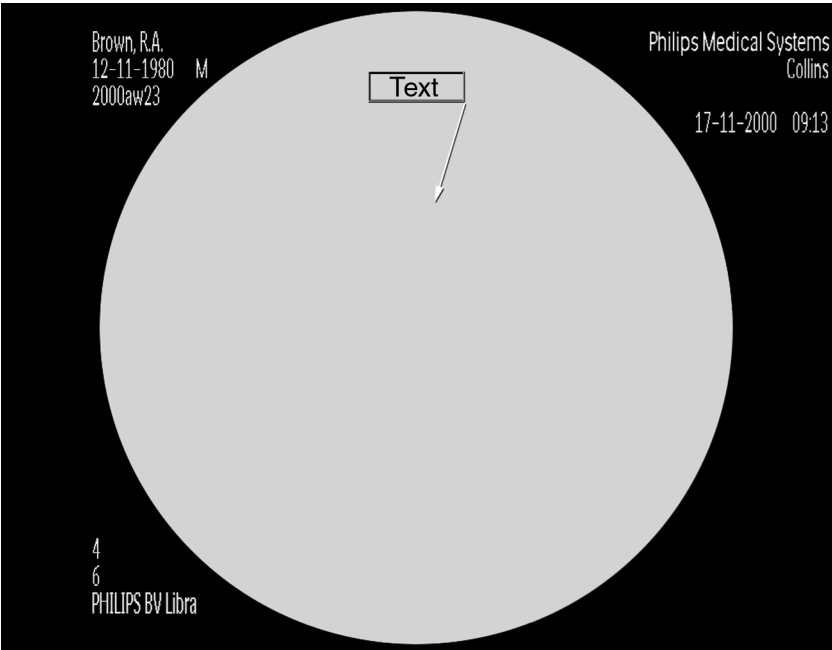


Figure 5.38 Annotation

Adding an annotation



- 1 Move the pointer to the |Annotation| button and press the |Acc| key [36]. An empty text box with a line is displayed. Any previously made annotation is removed.
- 2 Using the trackball, position the line to position of interest on the image and press the |Acc| key [36].
- 3 Using the keyboard [21], enter the remark and press the |Acc| key [36]. To add a line break, press the |Enter| key [21a]. For special characters see Section 10.1, ‘Special characters’.

When accepted, no text changes can be made afterwards. If the text is incorrect, restart at step 1.

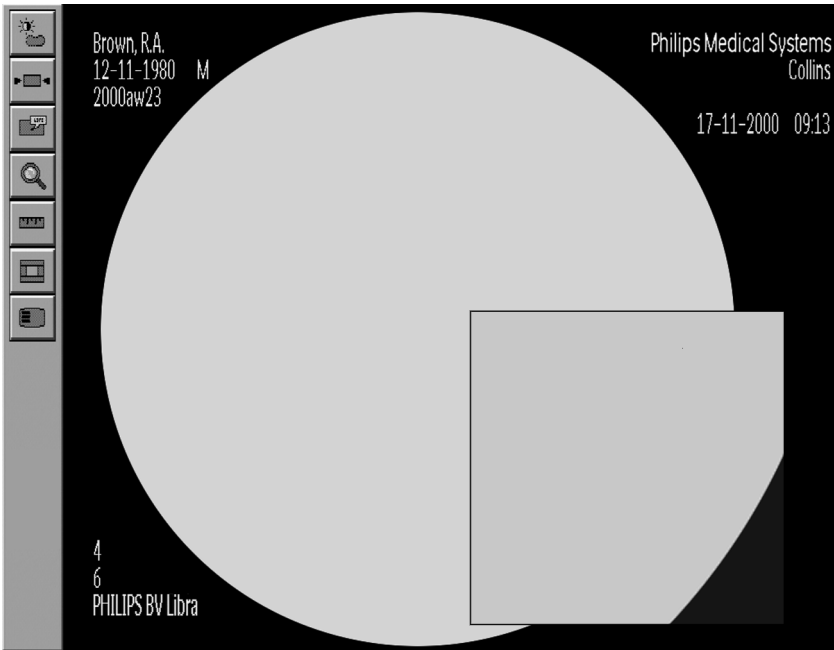
NOTES

- *The maximum number of characters is 30.*
- *When adding an annotation, the position of the text field cannot be changed. This must be done afterwards.*

Tips	
Changing and repositioning	The text box, arrow or both can be repositioned by selecting the text box, arrow or arrow line respectively.
Remove annotation	The text box and the arrow can be removed by selecting the text box and pressing the  Delete  [21b] key.

5.20.4      **Zoom (optional)**

With the ‘Zoom’ function any part of the image can be magnified by a factor of 2.



**Figure 5.39**    Zoom



- 1    Move the pointer to the |Zoom| button and press the |Acc| key [36].
- 2    Using the trackball, position the square to the position of interest and press the |Acc| key [36].

Tips	
Reposition the square	Move the pointer to the square, press the  Acc  key [36] and reposition it.
Unzoom	Move the pointer to the square, press the  Acc  key [36] and press the  Delete  [21b] key.

**NOTES**

- *A zoomed image cannot be zoomed again to provide more magnification.*
- *The ‘Zoom’ function can be used together with the ‘Annotation’ and ‘Measure’ functions.*
- *During positioning, annotation and measurement are invisible.*

### 5.20.5 Measure (optional)

With the 'Measure' function, distance and/or an angle can be measured. Before a measurement can be performed a calibration must be applied to set a reference size.



- 1 Move the pointer to the |Measure| button and press the |Acc| key [36]. A sub-menu appears.

When the current run is not calibrated the pointer is on the |Calibrate| button, otherwise it is on the |Measure size| button.

- 2 To remove the measurement, move the pointer to one of the items of the measurement, press the |Acc| key [36] and press the |Delete| key [21b].



#### WARNING

***It is the responsibility of the operator to guard against disturbances such as geometric enlargement or patient translations.***

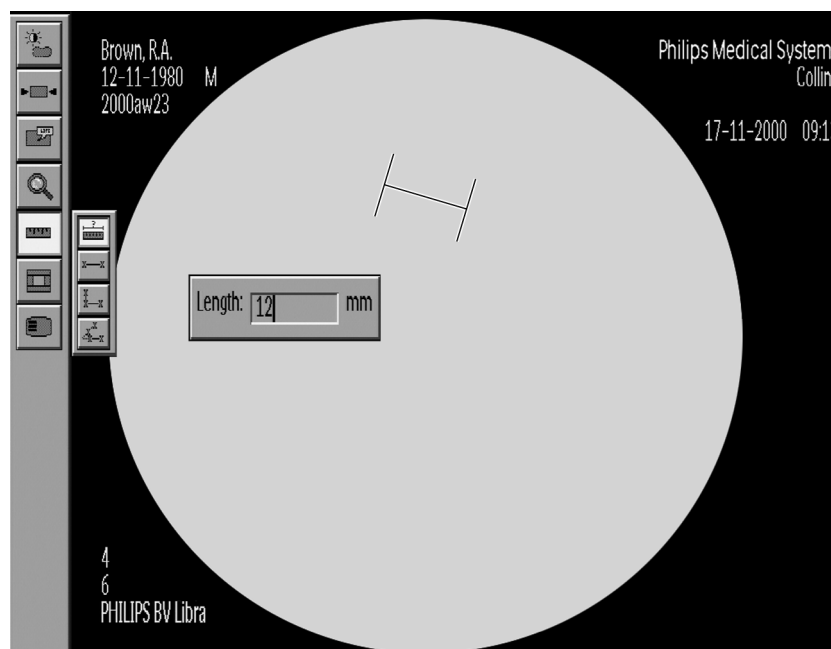
#### NOTE

***Use the 'Zoom' function in combination with 'Measure' for more accuracy.***

#### Calibrate



- 1 Move the pointer to the |Calibrate| button and press the |Acc| key [36].
- 2 Move the pointer on the image to the first point of calibration and press the |Acc| key [36].
- 3 Move the pointer on the image to the second point and press the |Acc| key [36].
- 4 Using the keyboard [21], fill in the desired length.



**Figure 5.40** Measurement calibration

#### NOTES

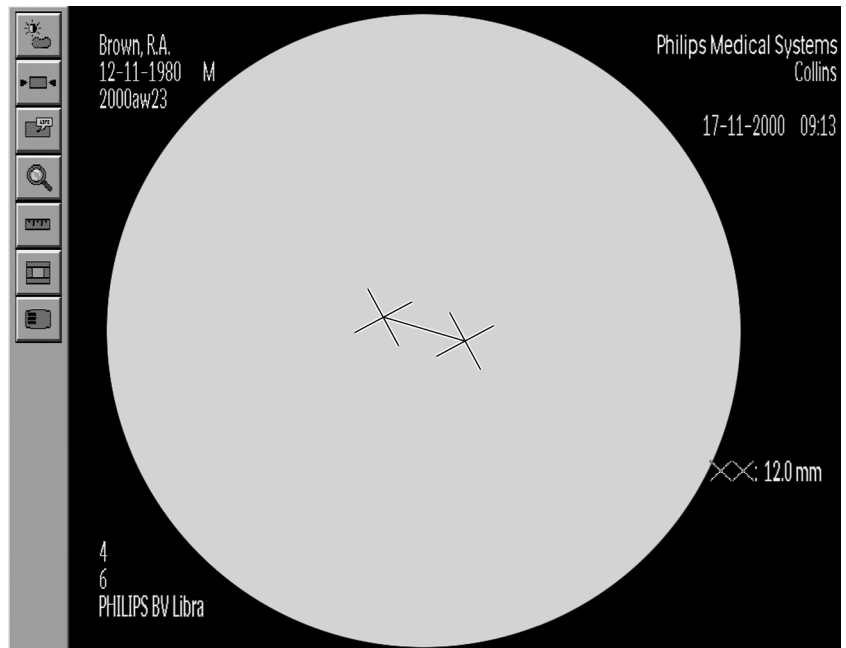
- ***Any of the images in a run can be used for calibration. The calibration is valid for all images in that run.***
- ***It is not possible to have more than one calibration per run.***
- ***If a measurement function is activated while the run is not calibrated yet a warning is displayed.***

**Measure distance**

This is a two-point measurement.

- 1 Move the pointer to the [Distance] button and press the [Acc] key [36].
- 2 Move the pointer on the image to the first point and press the [Acc] key [36].
- 3 Move the pointer on the image to the second point and press the [Acc] key [36].

The distance is displayed.



**Figure 5.41** Measurement of two points

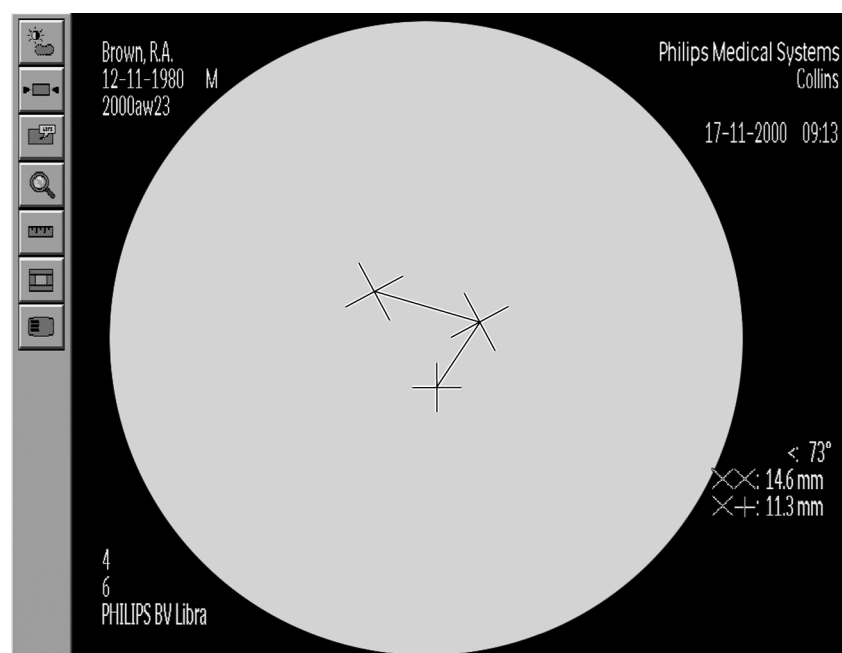


### Measure distance and angle

This is a three-point and angle measurement.

- 1 Move the pointer to the [Distance and angle] button and press the [Acc] key [36].
- 2 Move the pointer on the image to the first point and press the [Acc] key [36].
- 3 Move the pointer on the image to the second point and press the [Acc] key [36].
- 4 Move the pointer on the image to the third point and press the [Acc] key [36].

The distances and the angle are displayed.



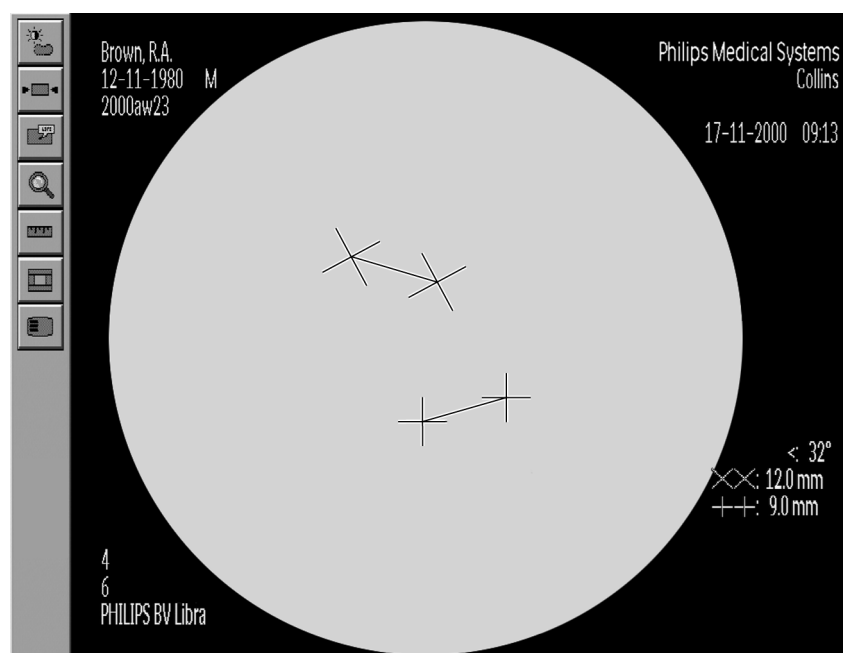
**Figure 5.42** Measurement of three points and the angle

**Measure two distances and angle**

This is a four-point (two separate lines) and angle measurement.

- 1 Move the pointer to the [Two distances and angle] button and press the [Acc] key [36].
- 2 Move the pointer on the image to the first point and press the [Acc] key [36].
- 3 Move the pointer on the image to the second point and press the [Acc] key [36].
- 4 Move the pointer on the image to the third point and press the [Acc] key [36].
- 5 Move the pointer on the image to the fourth point and press the [Acc] key [36].

The distances and the angle are displayed.



**Figure 5.43** Measurement of two distances and the angle

5.20.6 Electronic shuttering (optional)

With the ‘Electronic shuttering’ function (also called ‘electronic blanking’), irrelevant and/or distracting parts of the image can be covered. The covering is applied to all the images in the current run.



- 1 Move the pointer to the |Electronic blanking| button and press the |Acc| key [36]. A sub-menu appears.
- 2 Move the pointer to the desired shutter(s) or iris and press the |Acc| key [36].
- 3 Move the selected shutter(s)/iris in- or outwards by moving the pointer to the accompanying button and press the |Acc| key [36].  
The selected shutter(s)/iris moves in- or outwards until the |Acc| key [36] is pressed again (with the pointer on it).
- 4 Rotate the selected shutter(s) by moving the pointer to the accompanying button and press the |Acc| key [36].  
The selected shutter(s) rotates until the |Acc| key [36] is pressed again (with the pointer on it).
- 5 Move the pointer to the |OK| button and press the |Acc| key [36] to apply the changes.

**NOTE** Both shutters can be selected.

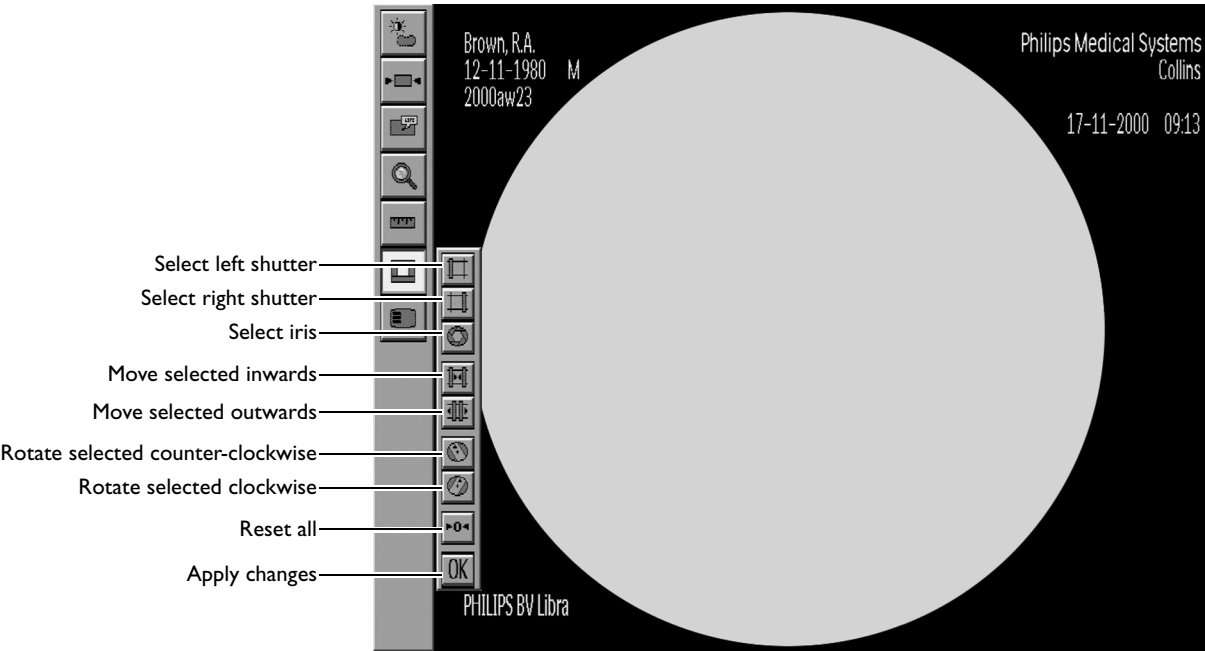


Figure 5.44 Electronic shuttering

Tips	
Moving shutter/iris	Press the  ACC  key [36] to start moving. Press it again to stop.
Cancel blanking	Press the  Undo  key [35] a number of times to exit the blanking function  Use the  Reset  button to return to the default position.

### 5.20.7 Add text for hardcopy (activated by default)

The 'Add text for hardcopy' function displays the text on images to be printed on paper/transparency, such as the patient and hospital name. The additional text is displayed by default.



- 1 Move the pointer to the |Additional text for hardcopy| button and press the |Acc| key [36]. The additional text will be removed from the image.
- 2 To view the additional text, move the pointer to the |Additional text for hardcopy| button and press the |Acc| key [36].

### 5.20.8 Invert image



- 1 To invert the images in a run, press the |Invert image| key [28]. A LED indicates whether the image is inverted.
- 2 Pressing the key again will restore to normal.

## 5.21 Options and accessories

Before an examination is started, install the options and accessories as required. Also if applicable:

- connect and position the foot switch
- install the cassette holder and place the films
- place the video cassette(s) / cd-r(w) disc(s)
- check the presence of paper/transparency in the printer.

### 5.21.1 Laser positioning tools

#### WARNINGS



- *Class II (FDA) / Class 3A (IEC) laser, do not stare into the beam.*
- *The laser must not be switched on without purpose, and unnecessary exposure must be avoided.*
- *Use of controls, adjustments or procedures other than those specified in this Instructions for use may result in hazardous radiation exposure.*
- *The II LAT and the tank LAT plate should be removed when not in use.*

#### A Laser alignment tool (LAT) in the X-ray tank



#### WARNINGS

- *The laser should not be used for target alignment when the light-cross centre does not coincide with the cross mark on the target cross plate. If this occurs do not use the system until the problem is corrected by a Service technician.*
- *When the C-arm is positioned, the alignment accuracy decreases.*

- 1 Remove the two grid screws from the image intensifier.
- 2 Using the two grid screws, install the target cross plate on the entrance screen of the image intensifier. Fully fasten the screws.
- 3 The laser alignment tool is switched on by pressing the [LAT on/off] key [4] on the C-arm stand. A LED next to the key is on.
- 4 There are no adjustments needed prior to the examination.

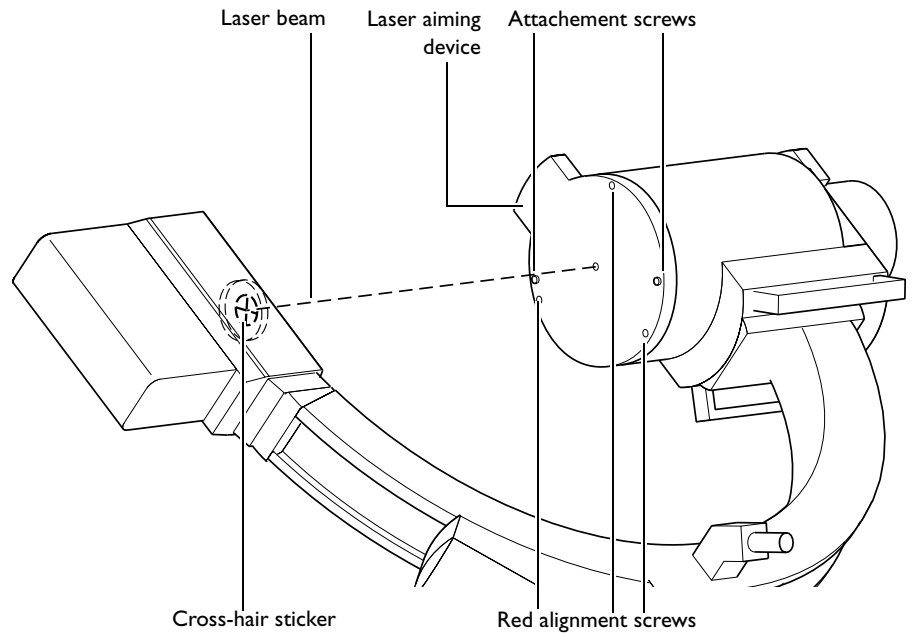


#### NOTE

*For maximum accuracy of the laser alignment tool, check the aiming with the frequency as described in Section 7.2, 'User routine checks programme'.*

**B Laser aiming device for the image intensifier**

- 1 Remove the two grid screws from the image intensifier.
- 2 Using the attachment screws of the laser aiming device, install it on the entrance screen of the image intensifier. Fully fasten the screws.
- 3 Switch on the laser by pressing the key on the side of the laser aiming device.
- 4 Align the laser point with the centre of the target cross sticker on the spacer using the red alignment screws.

**Figure 5.45** Adjusting the laser aiming device

### 5.21.2 Fitting sterile covers

Both sterile cloth and disposable covers can be fitted on the BV Libra.



#### WARNINGS

- *Installing the sterile covers must be performed by two persons. One must wear sterile clothes and gloves.*
- *Do not allow the sterile covers to touch the floor or non-sterile parts.*

#### Sterile cloth covers



**Figure 5.46** Sterile cloth covers

- 1 Position the C-arm to a suitable height (about middle height) and in horizontal position.
- 2 Hold the spring bow and slide it into the open end of the spring bow cover.



**Figure 5.47** Installing the sterile cover on the spring bow

- 3 Position one end of the spring bow at the image intensifier end of the C-arm, twist it slightly and clip it on.
- 4 Position the other end at the X-ray tank end of the C-arm and clip it on.
- 5 Cover the image intensifier and the tank and fasten the drawcords.

**Disposable sterile covers**

The BV Libra can also be fitted with disposable plastic sterile covers. They are fitted the same way as the sterile cloth covers as described above.



**Figure 5.48** Disposable sterile covers

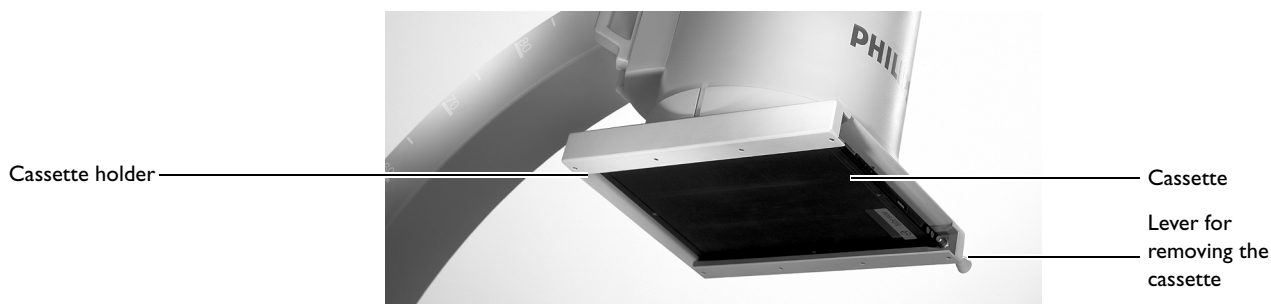
### 5.21.3 Installing the cassette holder

The cassette holder can be clicked on the image intensifier. The cassette holder can also be installed over sterile covers. Make sure the cassette holder is positioned properly and cannot fall off.

**NOTE** *If the cassette holder is installed without a cassette inserted, fluoroscopy can still be performed.*



**WARNING** *Do not secure a cassette in any other way than as described below. Optimal alignment of the X-ray beam is only possible with a properly inserted cassette.*



**Figure 5.49** Cassette holder with inserted cassette

- 1 Open the clip.
- 2 Place the cassette holder over the entrance of the image intensifier.
- 3 Close the clip.
- 4 Check if it is secured properly.
- 5 Push the cassette in the cassette holder until it clicks.
- 6 To remove the cassette release the lever on the cassette holder while holding the cassette.

### 5.21.4 Spacer for minimum Source-Skin distance

The spacer safeguards a minimum Source-Skin distance (SSD). In some countries a 30 cm spacer is required.



**WARNING** *There must always be a spacer installed to safeguard the minimum statutory source-skin distance.*

For specific surgical applications, which need a SSD shorter than 30 cm, it is allowed to install the 20 cm spacer.

The 30 cm spacer must be re-installed when the surgical application has been completed.

## 5.21.5

**Optional equipment****CAUTION**

*Optional equipment is only to be used if it is CE labelled and fully compatible with the BV Libra. The use of accessory equipment not complying with the equivalent safety requirements of the systems may lead to a reduced level of safety in the resulting system.*

**WARNING**

*Any patient environment equipment connected to the BV Libra must comply with UL2601-1 and IEC 60601-1 requirements. Equipment outside the patient environment may only be connected to the BV Libra if it complies with the relevant UL and EN/IEC standards.*

For the video output special precautions should be made according to the following warning.

**WARNING**

*The use of accessory equipment not complying with the equivalent safety requirements of this equipment may lead to a reduced level of safety in the resulting system. Consideration relating to the choice shall include:*

- *use of the accessory in the patient vicinity*
- *evidence that the safety certification of the accessory has been performed in accordance with the appropriate IEC 60601-1 and/or IEC 60601-1-1 harmonized national standards.*



## 6 System and error messages

This Section describes the handling of system and error messages appearing on the BV Libra.

### 6.1 The C-arm stand

When an error occurs an error code and its description are displayed.



- 1 Press the |Information| key [2] to display the more information about the error code.
- 2 Use the soft-keys [20] to walk through the pages if necessary.

The error code and description are displayed together with instruction(s). When instructed to call Service, note the error code and the date and time.

### 6.2 The mobile viewing station

Error and system messages are displayed on the examination monitor.

The system messages appear while performing an action and are self-explanatory.

The error messages appear on a black screen. Note the message and the date and time, and call Service.

### 6.3 The printer

Error messages appear on the printer's display.

For a complete list of the error messages and the possible cause and remedies see the printer's Instructions for use.

### 6.4 MDVDR

Error messages appear on the MDVDR LCD.

Press the |STOP| button on the MDVDR to clear error messages from the LCD after taking appropriate action.

For a complete list of the error messages and the possible cause and remedies see the MDVDR's Instructions for use.

## 6.5 ViewForum Surgical Workstation

For a complete list of the error messages and the possible cause and remedies see the workstation's Instructions for use.

## 7 Maintenance

### 7.0 Introduction

The BV Libra not only requires proper operation, but planned maintenance and user routine checks. Such planned maintenance and user routine checks are essential to keep the equipment operating safely, effectively and reliably.

### 7.1 Planned maintenance programme

Planned maintenance may only be carried out by qualified and authorized service technicians, and is comprehensively described in the service documentation. In this context, qualified means those legally permitted to work on this type of medical electrical equipment in the jurisdiction(s) in which the equipment is being used, and authorized means those authorized by the user of the equipment.

Philips provides a full planned maintenance and repair service on both a call basis and a contract basis. Full details are available from your Philips Service Organization.

Although the operator does not carry out planned maintenance, always take all practical steps to make sure that the Planned Maintenance Programme is fully up to date before using the equipment with a patient.

Item	What to check	Frequency
Earth (ground)	Check earth (ground) of whole system	Yearly
Earth leakage current	Check earth leakage current	Yearly
Power supplies	Check AC/DC voltages	Yearly
PCB's and racks	Ensure secure fitting Check for dust and corrosion	Yearly
Monitor	Check for correct functioning	Yearly
Motorized height movement	Check electrical and mechanical settings	Yearly
Interlocks	Check proper functioning	Yearly
Bearings	Check for dust and grease leakage	Yearly
Fans	Check for dust Check for correct cooling	Yearly
Steering chains	Check for wear Check for correct tension	Yearly
Controls and indicators	Check accuracy and function of the following: - all controls - all visible/audible indicators	Yearly

Item	What to check	Frequency
X-ray control	Check for correct function	Yearly
Alignment	Collimator alignment and field limitation Beam alignment and centring LAT alignment and function	Yearly
Mechanical	Fasteners and cables All mechanical stops Wheels, wheel alignment and cable deflectors Brakes and locks	Yearly
Optional	Check the function of the: - MDVDR - ViewForum Surgical Workstation - paper/transparency printer	Yearly
Image quality	Check performance	Yearly
Labels	Check for legibility	Yearly
Dose indication	Check accuracy and function	Yearly

## 7.2 User routine checks programme

The user of the BV Libra must institute a User Routine Checks Programme as detailed in the table below. Normally, the user will instruct operators to perform these checks and any corresponding actions. In any case, it is for the operator of the BV Libra to make sure that all checks and actions have been satisfactorily completed before using the BV Libra for its intended purpose.

Check	Description	Frequency
Accessories	Availability and integrity	Daily <sup>1</sup>
Cable deflectors	Check for presence and damage	Daily <sup>1</sup>
Brakes, wheels, steering	Ensure correct function	Daily <sup>1</sup>
Cabling	Inspect all cables for kinks and/or cracks	Daily <sup>1</sup>
Beep and lamp test	Check for correct function <sup>3</sup>	After start-up <sup>1</sup>
Connectors	Check correct connection and damage	Daily <sup>1</sup>
Power-on	Check display and monitor for error messages <sup>2</sup> See figure 5.10 for the expected start-up screens	Before use <sup>1</sup>
X-ray	Ensure correct function <sup>3</sup>	Daily <sup>1</sup>
	Check beep and lamp <sup>3</sup>	Daily <sup>1</sup>
	Check iris settings and verify their position <sup>3</sup>	Daily <sup>1</sup>
	Check the correct function of the system lock	Daily <sup>1</sup>
C-arm stand	Ensure correct function of the keys	Daily <sup>1</sup>
Hand switch	Check for damage and correct function	Daily <sup>1</sup>
Foot switch	Check for damage and correct function	Daily <sup>1</sup>
Height movement	Check for correct function	Daily <sup>1</sup>
Mobile viewing station	Ensure correct function of the monitors	Daily <sup>1</sup>
	Ensure correct function of the keys	Daily <sup>1</sup>
Laser alignment tool	Check for correct alignment <sup>3</sup>	Daily <sup>1</sup>
Printer	Check for correct function and paper/ transparency presence	Daily <sup>1</sup>
MDVDR	Check for correct function/DVD+RW presence	Daily <sup>1</sup>
ViewForum Surgical Workstation	Check for correct function	Daily <sup>1</sup>

<sup>1</sup> Visual and/or audible checks.

<sup>2</sup> Contact Service for advice on error messages which appear after start-up.

<sup>3</sup> For detailed instructions see below.

**X-ray control function check**

The X-ray control function check should be performed daily without any objects in the X-ray beam.

- 1 Press the 'kV' soft-key to select manual kV.
- 2 Enter 70 kV.
- 3 Press the 'kV' soft-key to select automatic kV and perform fluoro.
- 4 If the kV value drops to 42 - 47 kV the X-ray control function is working properly.

**Iris check**

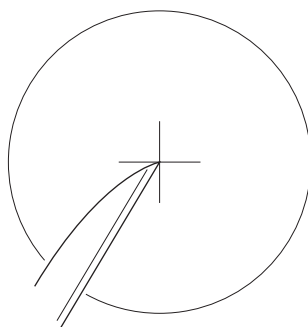
The iris should be checked daily.

- 1 Perform fluoroscopy without any objects in the X-ray beam and close the iris to about half the size.
- 2 Press the [Select iris] key [10] momentarily.  
The iris circle is displayed.
- 3 When the circle covers the edge of the image the iris setting is correct.
- 4 Perform the steps for the other II sizes.

**Laser aiming device check**

The laser aiming device check should be checked daily or directly after installation of the device.

- 1 Aim the laser as described in Section 5.20.1, 'Laser positioning tools'.
- 2 Place a pair of scissors, with its scissor point in the laser beam at 30 cm of the II.



**Figure 7.1** Laser aiming device check with scissor point

- 3 Perform fluoro.
- 4 Check if the scissor point coincide with the marking on the image.

**Laser alignment tool check**

The laser alignment tool (LAT) alignment check should be checked daily.

- 1 Install the target plate on the II as described in Section 5.20.1, 'Laser positioning tools'.
- 2 Turn the laser on by pressing the [LAT on/off] key [4].
- 3 Check if the laser cross coincides with the centre of the lead target plate cross.

**Beep and lamp test C-arm stand**

The beep and lamp test should be performed after start-up.

- 1 Press the [Information] [2] and the [Reset shutter(s)/iris] [13] keys simultaneously to activate the beep and lamp test.

All LEDs are illuminated, a blank (i.e. white/amber) screen will be displayed and all buzzers will sound.

- 2 Release the keys, or one of the keys, to stop the beep and lamp test.

**Beep and lamp test mobile viewing station**

The beep and lamp test should be performed after start-up.

- 1 Press the [Ctrl] and [Shift] keys simultaneously to activate the beep and lamp test.

A short beep sounds and all LEDs and the X-ray on indicator lamp will be turned on.

- 2 Release the keys, or one of the keys, to stop the beep and lamp test.

## 7.3 Cleaning and disinfection

The BV Libra needs to be cleaned and disinfected regularly.



### WARNING

***Always isolate the equipment from the mains electrical supply before cleaning or disinfecting. This will prevent electric shocks.***

### CAUTION

***Never allow water or other liquids to enter the equipment, since these may cause electrical short-circuits or metal corrosion.***

Cleaning and disinfection techniques for both the equipment and the room must comply with all applicable laws and regulations which have the force of law within the jurisdiction(s) in which the equipment is located.

### 7.3.1 Cleaning

Enamelled parts and aluminium surfaces may be wiped clean using a damp cloth and a mild detergent, and then rubbed with a dry woollen cloth. NEVER use corrosive cleaning agents, solvents, abrasive detergents or abrasive polishes. If you are not sure about the properties of a cleaning agent, do not use it. Chrome parts should only be cleaned by rubbing with a dry woollen cloth. Do not use abrasive polishes. To preserve the finish, use a non-abrasive wax.

#### Cleaning the MDVDR

Do not use liquid cleaners or aerosol cleaners.

### 7.3.2 Disinfection

All parts of the equipment, including accessories and connecting cables, can be disinfected by wiping with a cloth dampened with a suitable agent. NEVER use phenol based, corrosive or solvent disinfectant agents. If you are not sure about the properties of a disinfectant agent, do not use it.



### WARNING

***Do not use flammable or potentially explosive disinfecting sprays. Such sprays create vapours which can ignite, causing fatal or other serious personal injury.***

### CAUTION

***Disinfecting a medical equipment room by means of sprays is not recommended, since the vapour could penetrate the equipment, causing electrical short-circuits, metal corrosion or other damage to the equipment.***

Before non-flammable, non-explosive sprays can be used, the equipment must be switched off and allowed to cool down. This prevents convection currents drawing spray mist into the equipment. Plastic sheeting must be used to cover the equipment thoroughly, after which spraying can begin.

Once all traces of the vapour have dispersed, the plastic sheeting can be removed and the equipment itself can be disinfected in the way recommended above.

If a spray was used, make sure that all traces of the vapour have dispersed before switching the equipment on again.

### 7.3.3 Paper/transparency printer head cleaning procedure

The printer is supplied with a special cleaning sheet which can be used to clean the thermal head when the printout is dirty.

The full procedure for cleaning the printer heads is given in the printer's own user manual supplied with the unit.

#### CAUTION

- *Never press the 'Print' or 'Copy' buttons while the cleaning sheet is inserted.*
- *Only clean the head when necessary. Cleaning the head too often may cause a malfunction.*



## 8 Product disposal

### 8.0 Introduction

Philips Medical Systems is concerned to help protect the natural environment, and to help ensure continued safe and effective use of the BV Libra through proper support, maintenance and training.



Therefore Philips equipment is designed and manufactured to comply with relevant guidelines for environmental protection. As long as the equipment is properly operated and maintained, it presents no environmental risks. However, the equipment may contain material(s) which could be harmful to the environment if disposed of incorrectly. Use of such material(s) is essential to performing the functions of the equipment, and to meeting statutory and other requirements.

This section of this manual is directed mainly at the user of the equipment or system - the body with legal authority over the equipment. Operators are not usually involved in disposal, except in the case of certain batteries (see Section 8.3, 'Disposing of batteries').

### 8.1 Passing the BV Libra on to another user

If the BV Libra is to be passed on to another user who intends to use it for its intended purpose, then it should be passed on in its complete state. In particular, the existing user should make sure that all the product support documentation - including this manual - is passed on to the new user.

A new user should be made aware of the support services that Philips Medical Systems provides for installing, commissioning and maintaining the equipment or system, and for the comprehensive training of operators.

It must be remembered by all existing users that passing on medical electrical equipment to new users may create serious technical, medical and legal risks. Such risks can arise even if the equipment is given away. Existing users are strongly advised to seek advice from their local PMS representative before committing themselves to passing on any equipment. Alternatively, contact PMS at the address given below.

Philips Medical Systems  
GXR Business Team Surgery  
P.O. Box 10 000  
5680 DA BEST  
The Netherlands  
Facsimile: +31 40 276 3110

Once the equipment has been passed on to a new user, a previous user may still receive important safety-related information, such as bulletins and field change orders. In many jurisdictions, there is a clear duty on the previous user to communicate such safety-related information to new users. Previous users who are not able or prepared to do this should inform Philips Medical Systems about the new user, so that PMS can provide the new user with safety-related information.

## 8.2 Final disposal of the BV Libra

Final disposal is when the user disposes of the equipment or system in such a way that it can no longer be used for its intended purposes.



### WARNING

***Do not dispose of the BV Libra (or any parts of it) with industrial or domestic waste. This system contains lead, tungsten, oil and other hazardous materials which require special disposal. Incorrect disposal of any of these materials may lead to serious environmental pollution.***

As an aid to users, Philips provides support for the following procedures:

- recovering reusable parts
- recycling of useful materials by competent disposal companies
- safe and effective disposal of equipment.

For advice and information, first contact your Philips Service Organization, or otherwise Philips Medical Systems at the address below.

Philips Medical Systems  
GXR Business Team Surgery,  
PO Box 10 000  
5680 DA BEST  
The Netherlands  
Facsimile: +31 40 276 3110

## 9 Technical data

### 9.1 Standards and regulations

The Philips BV Libra complies with relevant national and international standards, regulations and laws. Information on such compliance is issued on request by your Philips Medical Systems representative or from:

Philips Medical Systems  
GXR Business Team Surgery  
P.O. Box 10 000  
5680 DA BEST  
The Netherlands  
Facsimile: +31 40 2763110

The system conforms to IEC 60601-1, class 1, type B, Ordinary equipment (enclosed without protection against ingress of water). The foot switch is watertight equipment (IPX7). In the BV Libra, the X-ray source assembly is Splash-proof equipment (IPX4). Mode of operation: continuous operation with intermittent loading as defined in Section 9.2.2.

The C-arm Stand and mobile viewing station (including all options and accessories delivered by Philips Medical Systems) are suitable for use within the patient environment.

The system is not suitable for use in the presence of a flammable anaesthetic mixture.

Philips will make available on request circuit diagrams, component parts list, descriptions, calibration instructions and any other information which will assist the appropriately qualified technical personnel to repair those parts of the equipment that have been designated by the manufacturer as repairable.

### 9.2 Specifications

#### 9.2.1 Environmental conditions

Condition	Value
Operating temperature	10 to 40°C (maximum permitted range) 10 to 35°C (optimal performance)
Storage temperature	-25 to 70°C
Relative humidity operation	20 - 80 %
Relative humidity storage	5 - 95 % (non condensing)
Air pressure operation & storage	700 / 1100 Hp
Vibration	10 - 150 Hz, 0.35 mm peak
Shock	25 g, 6 ms

## 9.2.2 Generator

Definition	Data
Type	HF converter, DC generator
Loading data: Fluoroscopy	Focus 0.6 IEC kV range 40 - 110 kV mA range 0.10 - 7.2 mA  Average load 200 W up to 30 s on Average load 150 W up to 60 s on
Loading data: High Definition Fluoroscopy	Focus 0.6 IEC kV range 40 - 110 kV mA range 0.24 - 7.2 mA Max. loading time 20 s Average load 100 W up to 110kV Average load 150 W up to 80 kV
Loading data Radiography	Focus 1.4 IEC kV range 40 - 105 kV Fixed 20 mA Single load – Average load 150 W Two loads – Cooling time between exposures 30 s - Waiting time for next 2 exposures 62 s
Loading data: Radiography (France)	30 mA - Max. loading time 333 ms - Waiting time for next exposure 20 s

## 9.2.3 Maximum loading factors

Definition	Fluoroscopy	Rad	Rad (france)
Nominal X-ray tube voltage	110 kV	105 kV	105 kV
Highest X-ray tube current	7.2 mA	20 mA	30 mA
Highest electric power	792 W	2100 W	3150 W
Nominal electrical power		2000 W (0.1 s, 20 mA, 100 kV)	
Lowest current time product		2.0 mAs, (0.1 s, 20 mA, from 40 kV to 105 kV)	

### 9.2.4 Accuracy of display

Definition	Value
Voltage deviation	$\pm (8 \% + 0.8 \text{ kV})$
Fluoroscopy current deviation	$\pm (8.5 \% + 0.01 \text{ mA})$
Radiography mAs deviation	$\pm (10 \% + 0.2 \text{ mAs})$
Dose rate accuracy	$\pm 25\%$

#### Dose area rate accuracy

Xray tube voltage	< 30% of maximum Beam diameter	> 30% of maximum Beam diameter
< 55 kV	40%	30%
> 55 kV	30%	25%

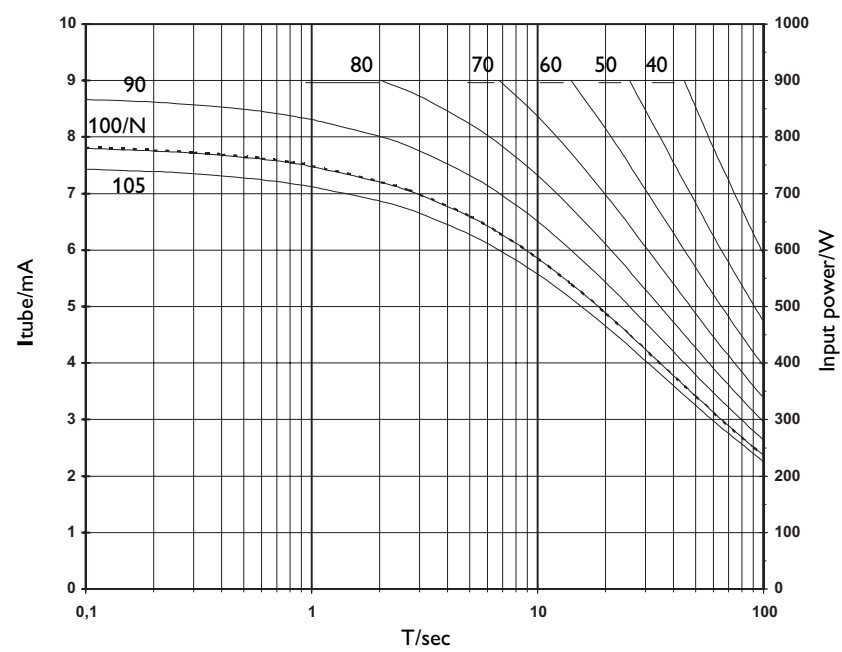
### 9.2.5 Measurement basis for approval tests

kV pk	Measured using a non invasive kV pk meter placed 30 cm from the focus. Additional filters (1 mm Al & 0.1 mm Cu) removed.
mA	Measured directly in the rectified high voltage circuit. The voltage over the mA feedback resistor was measured on the test points.
Time	The exposure time measured using a time function in the dose meter.
mAs	The mAs product calculated using the mA and time results.
X-ray output	Measured using a dose meter placed in the reference axis of the X-ray beam.
Leakage and scattered radiation	Use manual kV control and set to kV max. Read the displayed mA value and scale the radiation results for the test mA.

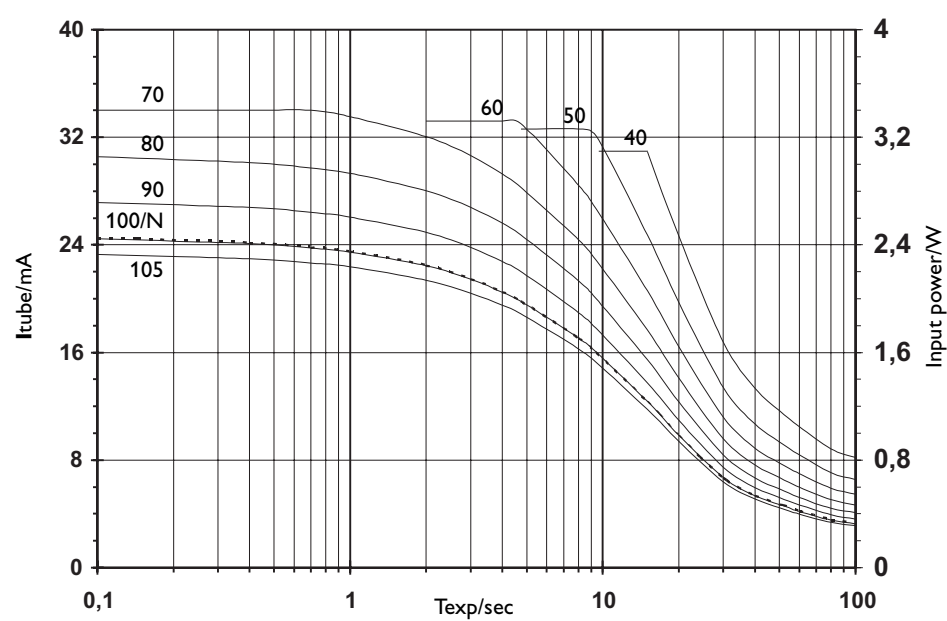
### 9.2.6 X-ray tube

Definition	Specification
Type	Fixed anode
Manufacturer	Philips Medical Systems Development and Manufacturing Centre
Model name	FO17
Model number	9890 000 64801
Nominal anode input power small focus	0.81 kW
Nominal anode input power large focus	2.1 kW

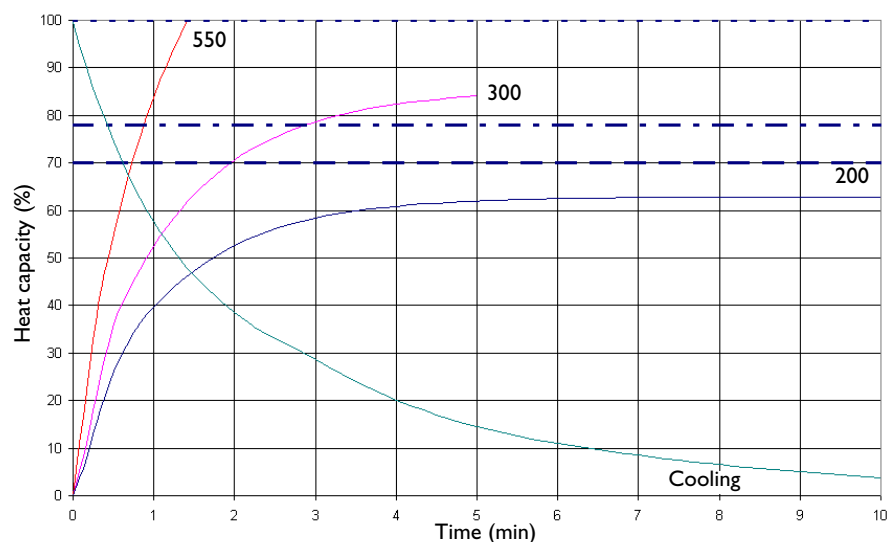
Definition	Specification
Maximum anode heat content	35.5 kJ (50.1 kHU)
Maximum continuous heat dissipation	200 W
Maximum heat dissipation	360 W (30.6 kHU)
Target material	Tungsten
Target angle	12°
Nominal focal spot values	0.6 & 1.4 IEC
Quality equivalent filtration	0.6 mm Al eq.
Nominal X-ray tube voltage	110 kV



**Figure 9.1** Single load rating small focus, 150 W eq. anode input power



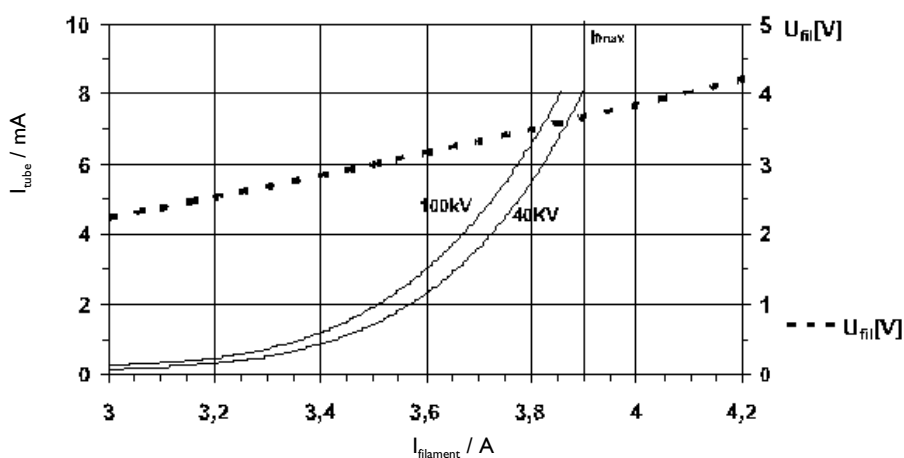
**Figure 9.2** Single load rating large focus, 150 W eq. anode input power



**Figure 9.3** Anode heating and cooling curves

### 9.2.7 X-ray tube assembly

Definition	Specification
Manufacturer	Philips Medical Systems Development and Manufacturing Centre
Model name	HT converter tank
Model number	9890 000 61831
Nominal X-ray tube housing voltage	110 kV
Inherent filtration	2.7 mm Al eq. @ 75 kV
Additional filtration	0.95 mm Al + 0.1 mm Cu
Permanent filtration (IEC 60522)	6.35 mm Al eq. @ 75 kV
Leakage technique factors	110 kV, 200 W



**Figure 9.4** X-ray tube Emission chart small focus, voltage DC

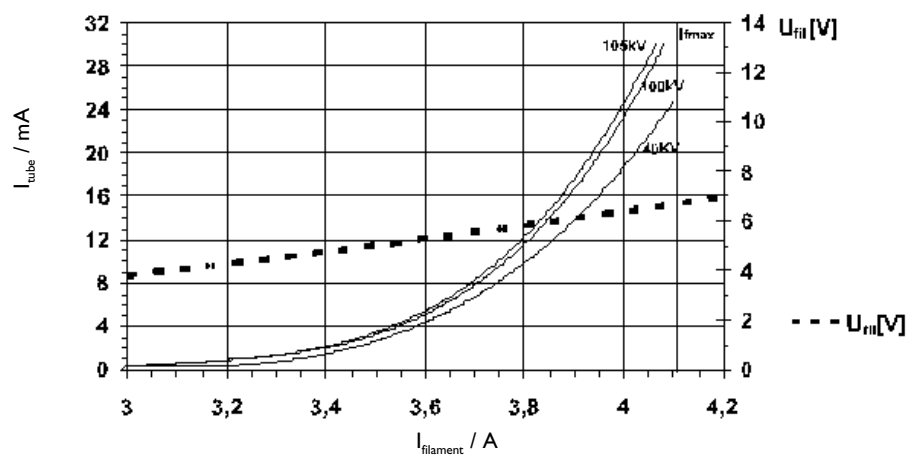


Figure 9.5 X-ray tube emission chart large focus, voltage DC

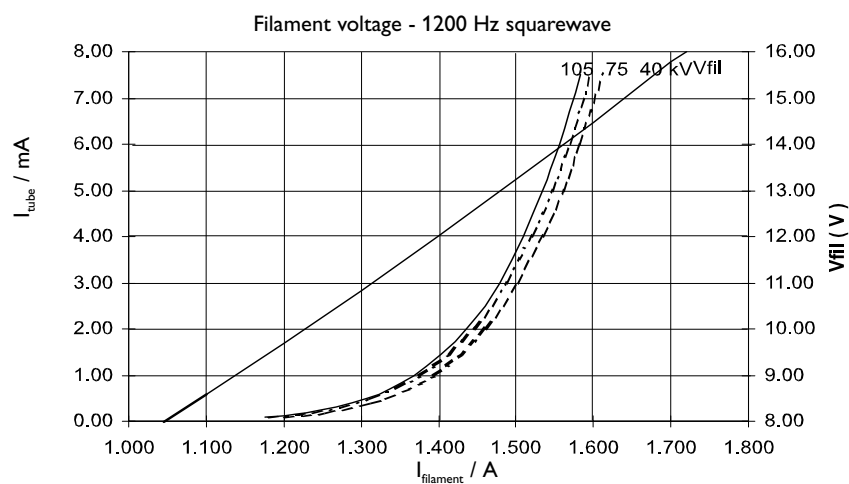


Figure 9.6 X-ray tank emission chart small focus

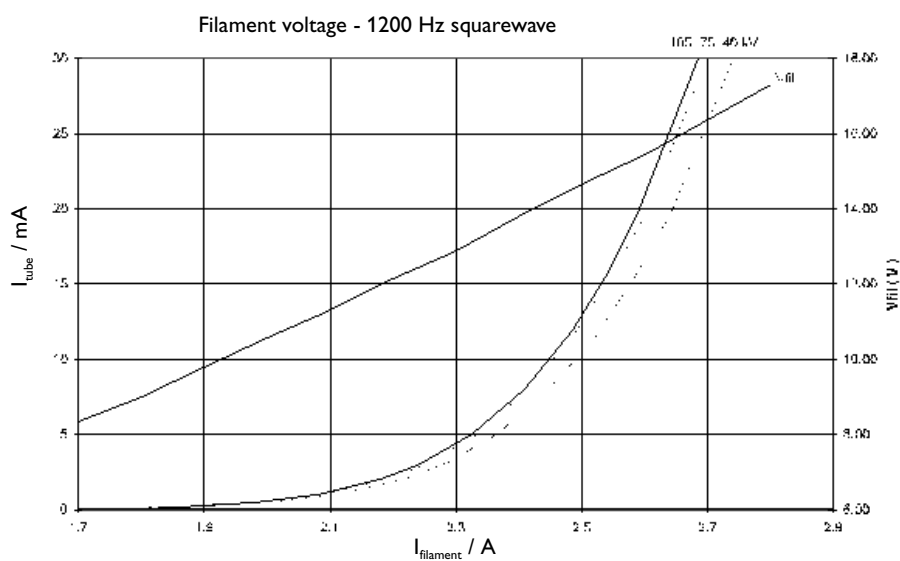


Figure 9.7 X-ray tank emission chart large focus

### 9.2.8 X-ray source assembly

Definition	Value
Maximum X-ray tube assembly heat content	840 kJ (1200 kHU)
Maximum continuous heat dissipation	140 W (11880 HU/min)

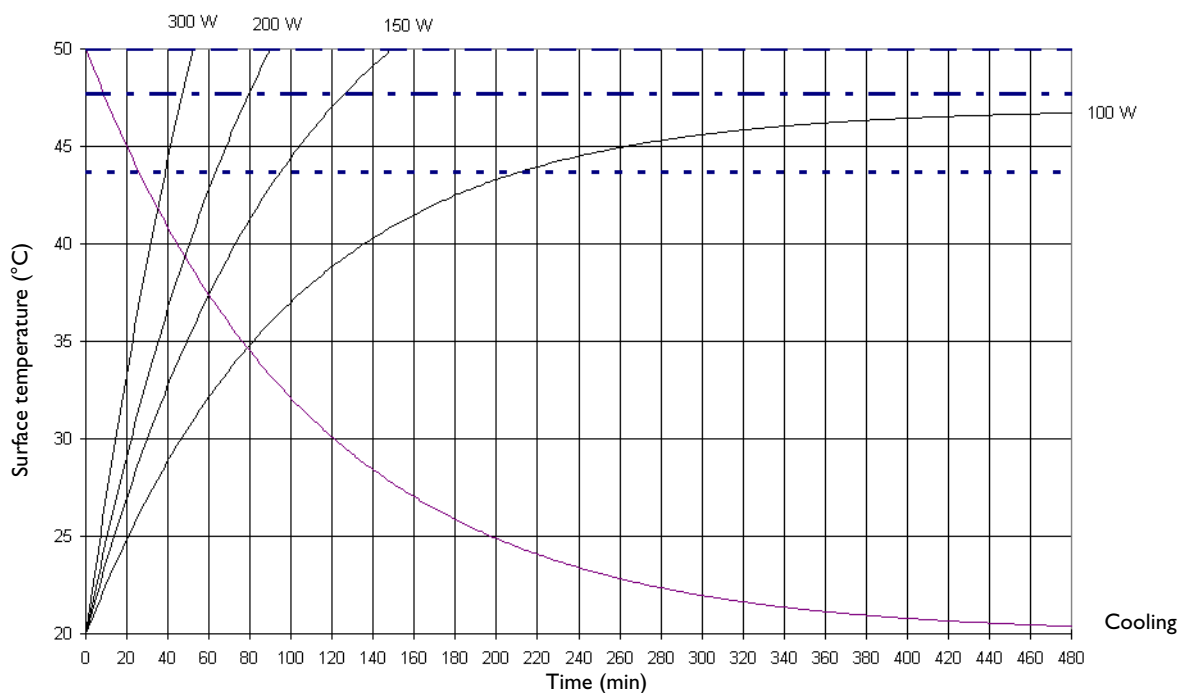


Figure 9.8 Heating and cooling curves

### 9.2.9 Iris collimator

Definition	6" version	9" version
Minimum beam diameter at II input window	< 5 cm	< 5 cm (in 14 cm mode)
Maximum Symmetrical Radiation Field (IEC 806)	240 mm 144 mm Fluoro only	240 mm 220 mm Fluoro only
Adjustment	stepless	stepless

### 9.2.10 Lead shutters

Definition	Value
Width adjustment	Down to < 4 cm slit at II
Rotation	360°
Operation	Remotely controlled
Shutters	2 independent
Indication on LIH	Yes

### 9.2.11 Dose (rate)

These are the typical dose rates for the BV Libra.

The actual dose rate displayed on the system is calibrated and is slightly different from the values in the table. At the maximum kV value, with larger objects the system switches into high penetration mode (HIP) and increases the mA (and dose) values.

Item	Libra 6"	Libra 9"	Libra 6" & 9"
Object	20 cm H <sub>2</sub> O	20 cm H <sub>2</sub> O	Maximum output
kV	71	66	110

Mode	Libra 6"		Libra 9"		Libra 6" & 9"	
	mA	uGy/s 70 cm	mA	uGy/s 70 cm	mA	uGy/s 70 cm
Cont. LDF <sup>1 2</sup>	2.75	110.47	2.11	70.10	3.00	389.40
Cont. HDF	6.59	265.14	5.06	168.20	7.20	934.60
INT 1 LDF <sup>1</sup>	0.66	26.51	0.51	16.80	0.72	93.50
INT 1 HDF	1.58	63.63	1.22	40.40	1.73	224.30
½ dose LDF <sup>1 3</sup>	1.37	55.24	1.05	35.00	1.50	194.70
½ dose HDF	3.30	132.57	2.53	84.10	3.60	467.30

<sup>1</sup> LDF HIP Same output as HDF modes

<sup>2</sup> IEC Normal dose mode

<sup>3</sup> IEC Low dose mode

II format	Libra 9"	
	Size	Dose
Middle	7" (17 cm)	50% increase
Small	5" (14 cm)	100% increase

The interventional reference point is intended to be representative of the point of intersection of the X-ray beam axis and the patient. For this type of system, normal use for interventional procedures is with the C-arm vertical or horizontal and the patient as close to the II as possible. The interventional reference point is 30 cm from the II entrance surface or 69.5 cm from the focal spot. (Ref. IEC 60601-2-43.)

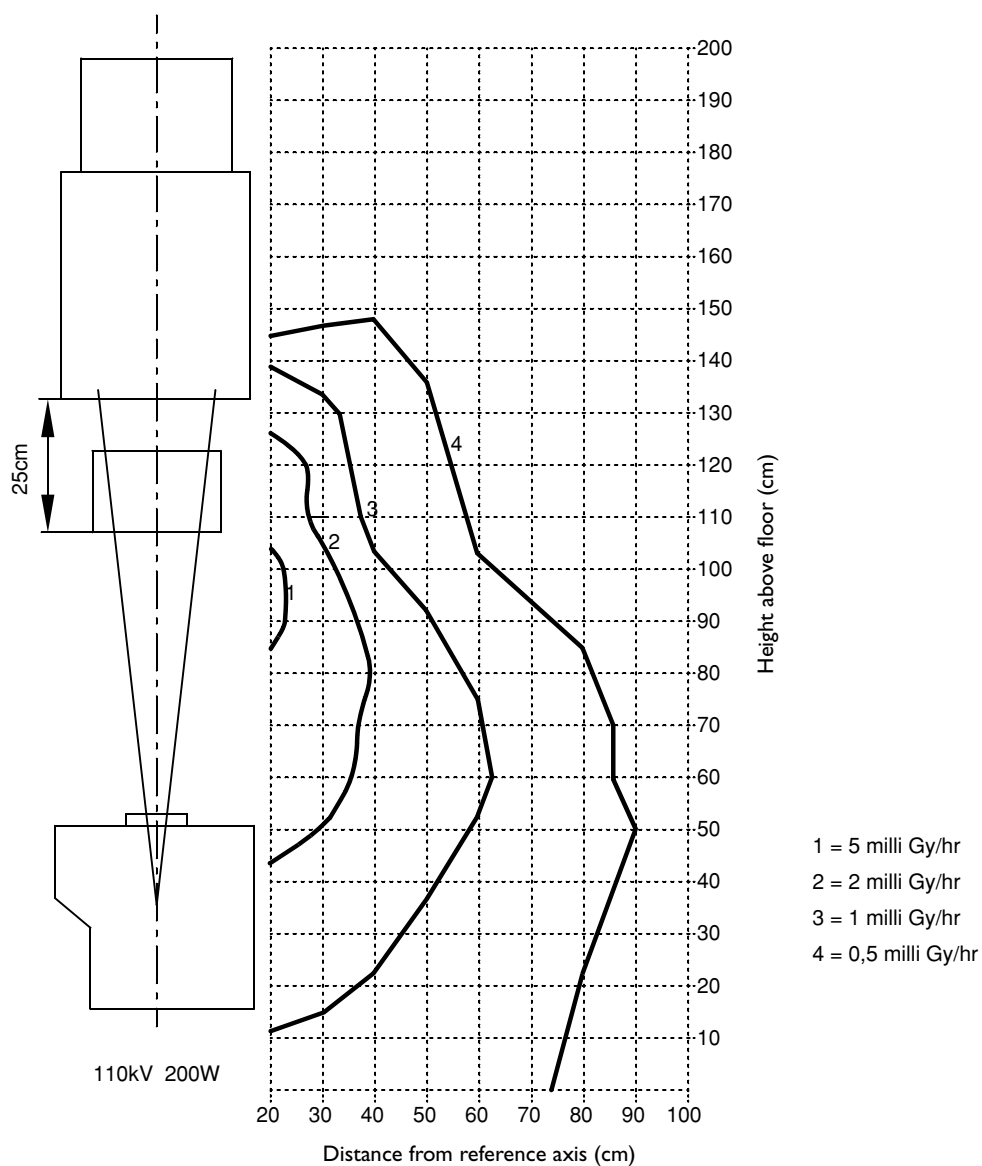
The error in estimating the total absorbed dose to the skin introduced from the defined point should average out as long as the procedure is composed of multiple views. Even under the worst case conditions, errors should be less than a factor of two. Of course, most of this error can be eliminated by assessing the position of the patient and calculating the appropriate correction factor. (Ref. IEC 60601-2-43.)

### 9.2.12 Dose rate settings

Dose	6" version	9" version
LDF	300 nGy / s	200 nGy / s
HDF	720 nGy / s	480 nGy / s

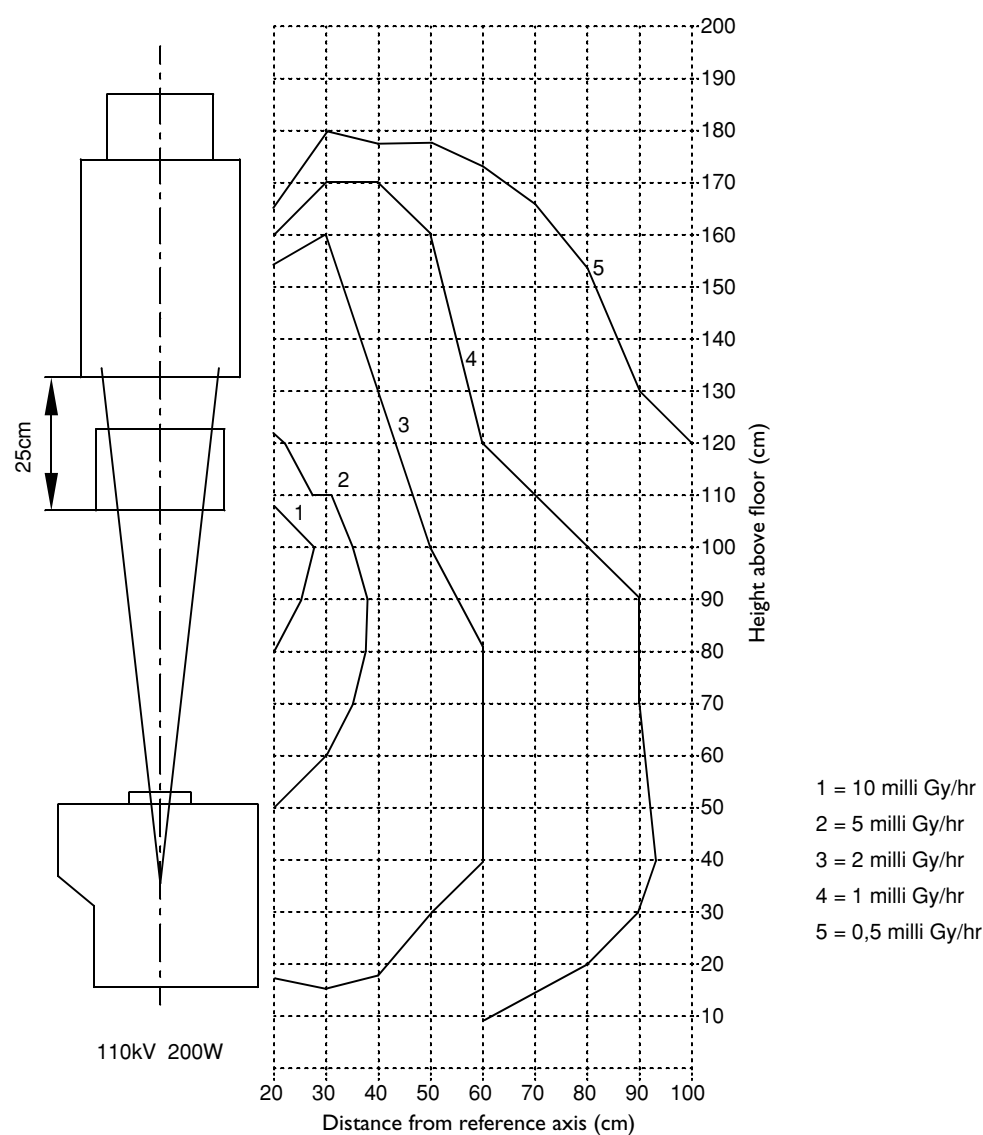
Dose rates measured before grid.

### 9.2.13 Scattered radiation 6"



Phantom: 25 x 25 x 15 cm water equivalent.

9.2.14
Scattered radiation 9"



Phantom: 25 x 25 x 15 cm water equivalent.

9.2.15
Leakage radiation factor

With an average load of 200 W at 110 kV, the leakage radiation does not exceed 873 nGy/h (100 mR/h) at 1 meter from the focal spot.

9.2.16
X-ray tank surface temperature

Message	Surface temperature
None	Tank surface temperature is within working range.
X-ray tank warm	Approx 44°C
X-ray tank very warm	Approx 48°C
X-ray tank disabled – tank too warm	Approx 50°C

### 9.2.17 Anode heat storage

The anode heat storage capacity is monitored in such a way that the anode can not be overloaded by successive high-definition fluoroscopy loadings or radiography exposures.

### 9.2.18 Grid

Definition	Specification
Type	Circular
Material	Carbon fibre
Lines / cm	60 / cm
FFD	100 cm
Ratio	1:10

### 9.2.19 Image intensifier

Definition	6" version	9" version
Type	Single mode	Triple mode
Input field size(s)	15 cm / 6 inch	23 – 17 – 14 cm / 9 – 7 – 5 inch
Input screen	Caesium Iodine (CsI)	Caesium Iodine (CsI)

### 9.2.20 TV camera

Definition	Specification
Type	High resolution CCD sensor with BV view image brightness regulation
Lines (interlaced)	625 at 50 Hz
Pre-processing	ADC and AGC
Video standards	CCIR (50 Hz)
Image rotation	Continuous $\pm 200^\circ$ (with pre-indication in screen)
Optics	High quality lenses with anamorphic optics

### 9.2.21 Monitors

#### Standard monitor

Definition	Specification
Type	High resolution anti-reflection/anti-static screen (MRP II), flicker-free display (75 Hz non-interlaced)
Size	43 cm/17 in

Definition	Specification
Brightness control	Automatic

### High-end monitor (optional)

Definition	Specification
Type	High contrast, high resolution triple gun/anti-static screen (MRP II), flicker-free display (75 Hz non-interlaced)
Size	43 cm/17 in
Brightness control	Automatic

### Flat screen LCD monitor (optional)

Definition	Specification
Type	High contrast, high resolution LCD, flicker-free display (75 Hz non-interlaced)
Size	46 cm/18.1 in
Image display format	1280 × 1024 maximum
Brightness control	Automatic
Movement range	+ 3 cm, - 35cm vertical
Rotation range	± 345 °
Viewing angle	± 85 ° horizontal or vertical

## 9.2.22 Digital processor

Definition	Specification
Display matrix	1008 × 576 × 8
Type	Dedicated 12 bit video pipeline processor with real-time processing and overlay
Disk storage capacity	50 – 500 – 1,000 images (depending on commercial option)
Maximum storage speed	50 images disk; up to 3 images / s 500 images disk; up to 3 images / s 1,000 images disk; up to 5 images / s
Processing options	Zoom Measure Subtraction Remask

### 9.2.23 Video out

Definition	Specification
Video signal	CRT: CCIR (50 Hz) interlaced LCD: NTSC (60 Hz) interlaced

#### Connectivity data Video output (DFI), 50 Hz and 60 Hz

Definition	50 Hz	60 Hz
Horizontal frequency	15,625 kHz	15.750 kHz
Horizontal front porch	1.50 ms	1.75 ms
Horizontal sync width	4.70 ms	4.90 ms
Horizontal blanking	12 ms	11.0 ms
Vertical frequency frame	25 Hz	30 Hz
Vertical frequency field	50 Hz	60 Hz
Vertical front porch	2.5 lines	3.0 lines
Vertical sync width	2.5 lines	3.0 lines
Vertical blanking (field)	25 lines	20 lines
Pixel aspect ratio	1.37	2.0
Pixel clock frequency	20.25 MHz	24.69 MHz
Pixels / line	1296	1568
Lines / image	575	484
Interlaced	Yes	Yes
External pixel clock available	No	No
Pre equal pls	5	6
Post equal pls	5	6
Separating pls	Yes	Yes

### 9.2.24 Data for laser copier programme

See section 9.2.23 'Video out'.

### 9.2.25 Power supply

Definition	Specification
Voltage	100, 110, 120, 130, 200, 210, 220, 230 or 240 V
Configuration	Single phase (power/neutral, separate earths)
Frequency	50 or 60 Hz
Max frequency deviation	+/- 1 Hz

Wall outlet sockets must be provided with a proper ground connection accepting grounding cord plugs. Mains plug must be Hospital grade in the USA and Canada. In other countries, the plug must be approved for use in this application by the relevant local safety regulations.

Mains supply	Stand-by	LDF	HDF	Rad
100/130 V	7 A	15 A <sup>1)</sup>	20 A <sup>1)</sup>	40 A <sup>1)</sup>
200/240 V	5 A	10 A <sup>1)</sup>	15 A	25 A <sup>1)</sup>
100/240 V	800 W	1200 W	1900 W	3500 W
100/240 V	950 VA	1400 VA	2200 VA	4500 VA

<sup>1)</sup> Mains current values are as quoted on the system labels.

#### NOTES

- **The specified values are quoted for a system without options or accessories.**
- **The measured values will not exceed the specified values by more than 10% (UL 2601).**
- **LDF, HDF and Rad values for maximum output.**

The resistance in the socket must conform as follows:

Definition	Values	Values (fluoro only)
100 V		
Current LT / mom	15 / 40 A (max 4 s)	15 / 20 A (max. 20 s)
Max impedance	0.1 $\Omega$	0.2 $\Omega$
Mains voltage tolerance	$\pm 10\%$	$\pm 10\%$
Mains fuse	Slow	Slow
120 / 130 V		
Current LT / mom	15 / 40 A (max 4 s)	15 / 20 A (max 20 s)
Max impedance	0.12 $\Omega$	0.24 $\Omega$
Mains voltage tolerance	$\pm 10\%$	$\pm 10\%$
Mains fuse	Slow	Slow
Mains plug (USA only)	NEMA 5-20P	NEMA 5-15P
230 V		
Current LT / mom	10 / 25 A (max 4 s)	Not applicable
Max impedance	0.6 $\Omega$	Not applicable
Mains voltage tolerance	$\pm 10\%$	Not applicable
Mains fuse	16 A slow	Not applicable

## 9.2.26 Options and accessories

### Options

DICOM	Specifications
Network protocol	Ethernet TCP / IP network using DICOM 3.0 protocol
Network medium	10BaseT, 100BaseT
DICOM conformance	Image storage (SCU) Basic print (SCU) Worklist management MPPS Storage commit
Exam based export	Yes

DFI option	Featuring
Processing	Contrast, brightness and edge enhancement Overwrite manual adjustment Annotation
Extended processing	Electronic blanking Zoom and pan Measure
Image storage	Capacity 50 – 500 – 1,000 images
Vascular functions	Subtraction Remask

Laser positioning tools	Specifications
Laser aiming device	Installed on image intensifier; Output power: - IEC class 3a - FDA class II Wavelength 670 nm Alignment accuracy < 0.3% of SID in vertical beam point projection Point projection
Laser alignment tool	Integrated in X-ray assembly, Output power: - IEC class 3a - FDA class II Wavelength 670 nm Alignment accuracy < 0.3% of SID in vertical beam point projection Cross hair projection on installed target cross plate with lead cross hair

Other options	Specifications
Spacers	30 cm SSD
MDVDR	See MDVDR instruction manual for specifications
Printers	<p>Manufacturer: Sony Type: UP-960 Media: paper</p> <p>Manufacturer: Sony Type: UP-980 Media: paper and transparency</p>
ViewForum Surgical Workstation	<p>Operating temperature:</p> <ul style="list-style-type: none"> <li>- 10 to 40 °C (maximum permitted range)</li> <li>- 10 to 30 °C (optimal performance)</li> </ul> <p>Network</p> <ul style="list-style-type: none"> <li>- 10BASE-TX, 100BASE-TX, 1000BASE-X</li> </ul> <p>Network protocol</p> <ul style="list-style-type: none"> <li>- Ethernet TCP/IP network using DICOM v3.0 protocol</li> </ul>

### Accessories

Accessories	Description
Sterile cover (3x)	<p>Tank unit (1x)</p> <p>Image intensifier (1x)</p> <p>C-arm (1x)</p>
Springbow	For sterile cover
Cassette holders	<p>Type universal cassette holder format</p> <p>6": (not for HHS systems)</p> <ul style="list-style-type: none"> <li>- 24x24 IEC 60406 or</li> <li>- 20x40 IEC 60406</li> </ul> <p>9":</p> <ul style="list-style-type: none"> <li>- 24x24 IEC 60406 or</li> <li>- 24x30 IEC 60406</li> </ul>



#### WARNING

**Only the options and equipment delivered by PMS may be used in conjunction with the BV Libra. The use of accessory equipment not complying with the equivalent safety requirements of this equipment may lead to a reduced level of safety in the resulting system.**

**Consideration relating to the choice shall include:**

- **use of the accessory in the patient vicinity and**
- **evidence that the safety certification of the accessory has been performed in accordance with the appropriate IEC 60601-1 and/or 60601-1-1 harmonized national standards.**

## 9.2.27

**C-arm stand dimensions****C-arm stand movement specification**

Definition	Specifications
Longitudinal travel	20 cm
Panning movement	$\pm 10^\circ$
Motorized height movement	49 cm (range from +43 to -8 cm)
Rotation	Beyond $\pm 180^\circ$ with safety stop at $\pm 135^\circ$
Angulation	+ $90^\circ$ / - $25^\circ$ optional - $45^\circ$
Source image distance	Fluoroscopy 99.5 cm Radiography with cassette holder 94.5
Minimal source skin distance	20 cm (optional 30 cm for USA)
Distance from image intensifier screen to X-ray tube output window	78 cm
Distance from C-arm to X-ray beam	61 cm
Weight 6"	260 kg
Weight 9"	260 kg

### Diagrams of the BV Libra versions

The following diagrams show the geometry of the 6" and 9" versions of the BV Libra alternatively. The dimensions of both systems are indicated on all diagrams. The geometry of the BV Libra C-arm stand 6" and 9" respectively.

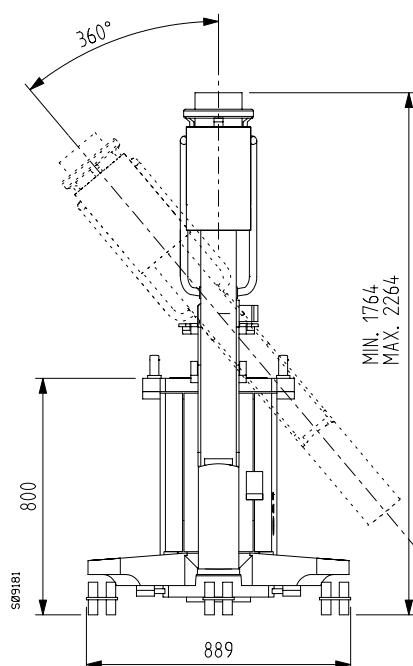


Figure 9.9 BV Libra 6" front view

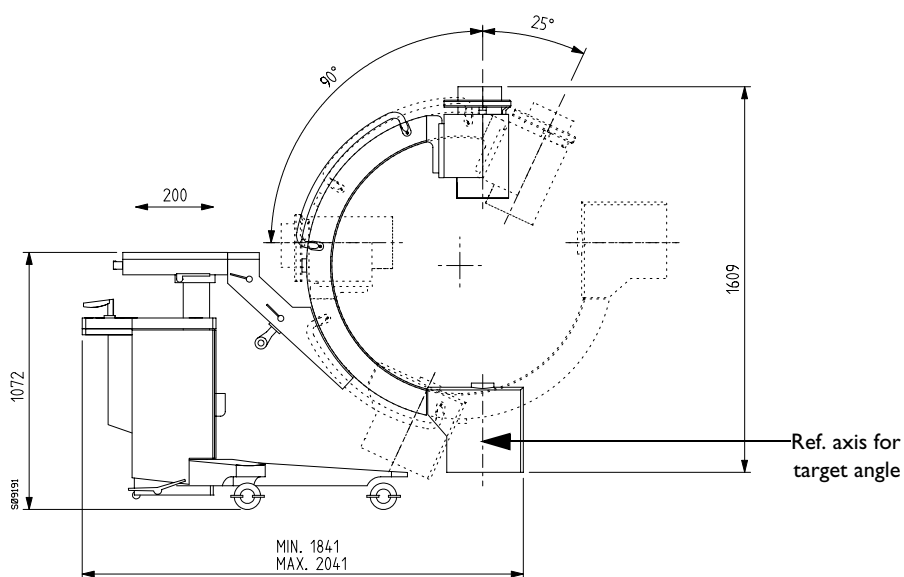
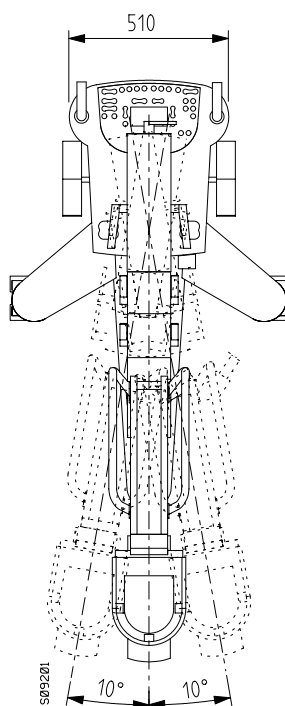
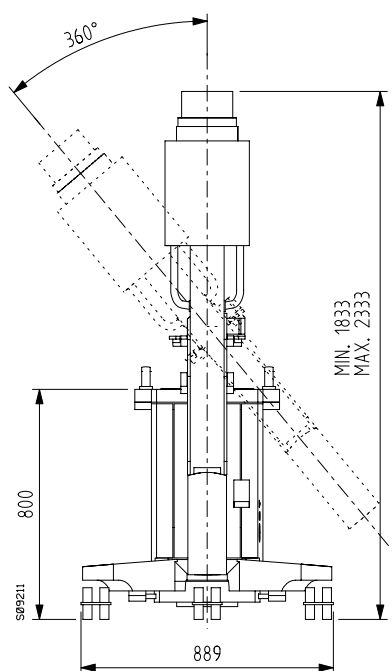


Figure 9.10 BV Libra 6" side view



**Figure 9.11** BV Libra 6" top view



**Figure 9.12** BV Libra 9" front view

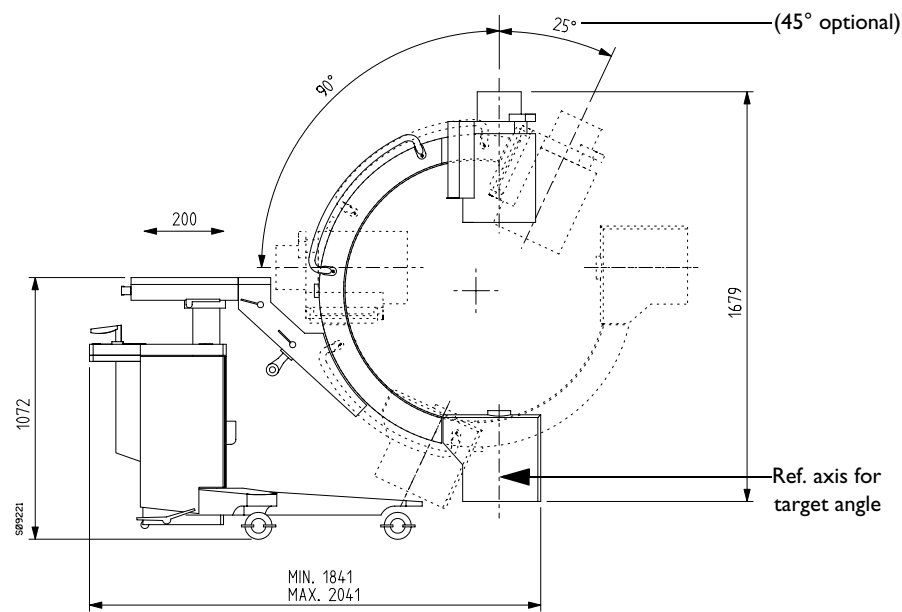


Figure 9.13
BV Libra 9" side view

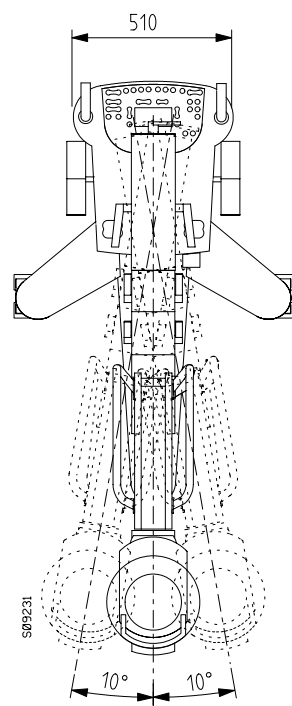
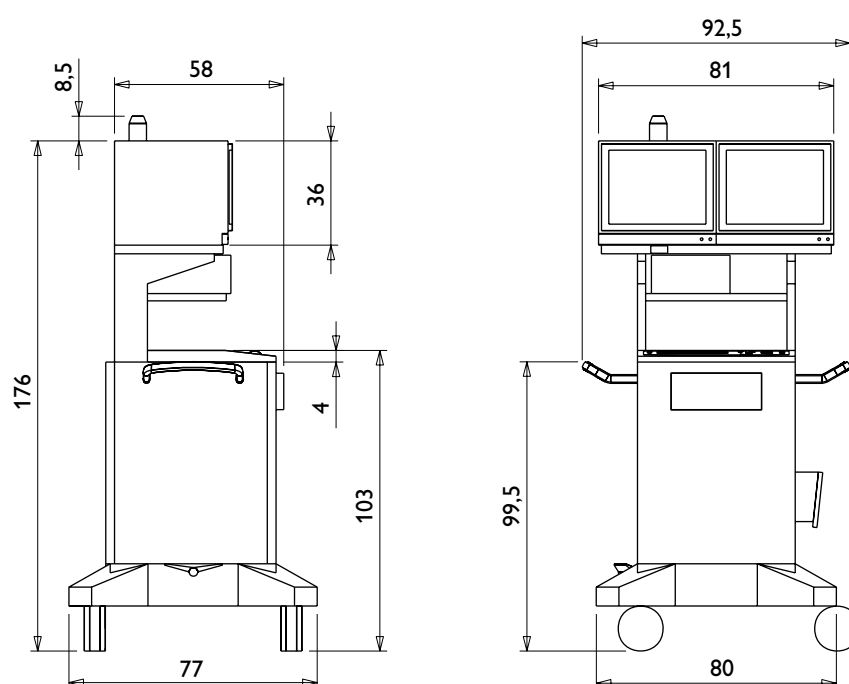


Figure 9.14
BV Libra 9" top view

## 9.2.28

**Mobile viewing station dimensions****Mobile viewing station specifications**

Definition	Specifications
Weight	210 kg
Video paper/transparency printer (option)	9 kg
Video Cassette Recorder (option)	7 kg
Video CD Recorder (option)	4.2 kg

**Mobile viewing station dimensions****Figure 9.15** BV Libra side and front view

9.2.29 **Certifiable items (USA only)**

Component type	Model designation	Labelling
X-ray control	Stand fixed anode	Central
Tube housing assy	HT converter tank	Central
Beam limiting device	Collimator	Central
Image intensifier	15 cm II tube assy	Central
	23 cm II tube assy	Central
Spot film device	9" cassette holder	Local
Television receiver	17" TV-monitor	Local
X-ray control	XTV-8 HPA TV-camera	Central
Laser product	Laser aiming device	Local
	Laser alignment tool	Central

## 10 Appendices

### 10.1 Special characters

The table below shows the special characters, which can be used in the 'Patient and examination' screen and the annotation field.

	1st	2nd		1st	2nd		1st	2nd		1st	2nd
±	+	-	È	E	'	Ü	U	"	ð	d	-
¢	c	/	É	E	'	Ý	Y	'	ñ	n	~
£	L	-	Ê	E	^	þ	l	p	ò	o	'
¤	o	x	Ë	E	"	ß	s	s	ó	o	'
¥	Y	=	Ì	I	'	à	a	'	ô	o	^
©	o	c	Í	I	'	á	a	'	õ	o	~
«	<	<	Î	I	^	â	a	^	ö	o	"
»	>	>	Ï	I	"	ã	a	~	÷	:	-
®	o	r	Ð	D	-	ä	a	"	ø	o	/
¼	1	4	Ñ	N	~	å	a	°	ù	u	'
½	1	2	Ò	O	'	æ	a	e	ú	u	'
¾	3	4	Ó	O	'	ç	c	,	û	u	^
À	A	'	Ô	O	^	è	e	'	ü	u	"
Á	A	'	Õ	O	~	é	e	'	ý	y	'
Â	A	^	Ö	O	"	ê	e	^	þ	l	o
Ã	A	~	×	/	\	ë	e	"	ÿ	y	"
Ä	A	"	Ø	O	/	ì	i	'			
Å	A	°	Ù	U	'	í	i	'			
Æ	A	E	Ú	U	'	î	i	^			
Ç	C	,	Û	U	^	ï	i	"			

**To create one of the special characters,**

- 1 Hold down the [Comp] key and press the '1st' required character for the special character.
- 2 Release the [Comp] key and press the '2nd' required character to complete the special character.

10.2

Menu and function selection tree

The table below shows the menu and function (behaviour) when using the soft-keys [20] on the C-arm stand.

Soft-key	Value
kV	+
	-
mA	+
	-
Speed	0 fr/s
	1 fr/s
	2 fr/s
	3 fr/s
	5 fr/s
Noise reduction	(there are six steps of noise reduction)

## 10.3 Quantitative data

The table below contains an overview of quantitative data.

Variable	Quantity
Maximum number of patients	99
Maximum number of examinations	99
Maximum number of images per run	999
Maximum number of physicians	50
Maximum number of characters for patient name	20
Maximum number of characters for remark text field	10
Maximum number of characters for registration number	12
Maximum number of characters for physician name	20 *
Maximum number of characters for annotation	30
Display matrix	1008 x 560
Storage matrix	792 x 560

\* In the 'Patient administration' page only the first three characters of the physician name are displayed.

## 10.4 Scattered radiation (Isokerma data)

### 10.4.1 Measurement conditions

The tests were made using the maximum X-ray beam for the size of the system.

A 25 cm cube PMMA phantom was placed 5 cm in front of the II input surface. The entrance plane of the phantom was therefore at the interventional reference point 30 cm in front of the II.

The results are normalized to 1 (uGy/s)/(uGym<sup>2</sup>/s). The following table provides details of:

- dose area product at the interventional reference point
- actual dose rate for a normalized value of 0.01 (uGy/s)/(uGym<sup>2</sup>/s).

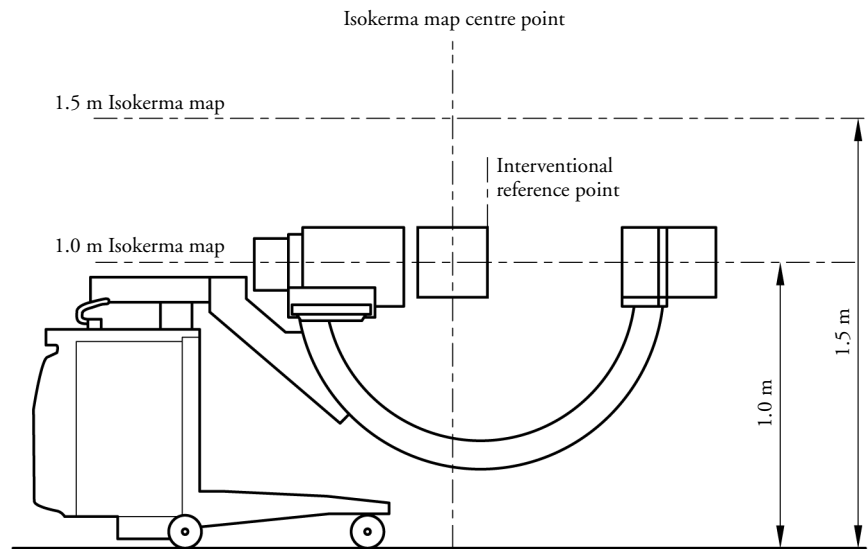
System	Nominal X-ray tube voltage [kV]	Dose area product [uGym <sup>2</sup> /s]	Dose rate [nGy/s]
BV Libra 9"	110	7.0	70.4
BV Libra 6"	110	3.1	31.0

The table height was set to 87.5 cm, meaning that the centre of the phantom was at a height of 1 meter above the floor.

The degree of uncertainty regarding the results is <±50%.

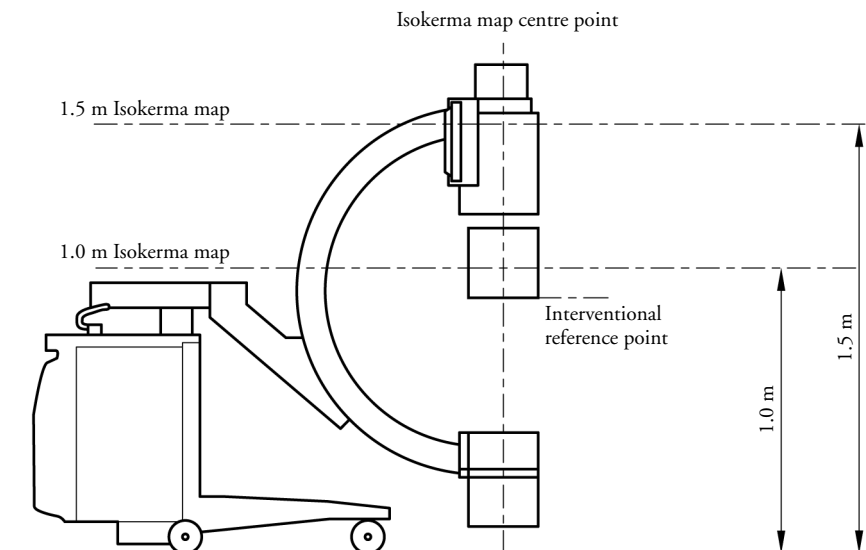
The following figures illustrate the measuring conditions for the system. Measurements were made in the horizontal position and in the lateral position.

### Horizontal position



**Figure 10.1** Isokerma map measurement configuration (horizontal)

### Lateral position



**Figure 10.2** Isokerma map measurement configuration (lateral)

10.4.2

Isokerma maps for BV Libra 6 inch II

Horizontal position

Height	
<div></div>	1.0 m
<div></div>	1.5 m
Values from outside to centre (uGy/s)/(uGym²/s)	
0.0025	
0.005	
0.01	
0.02	
0.04	
0.08	
0.16	

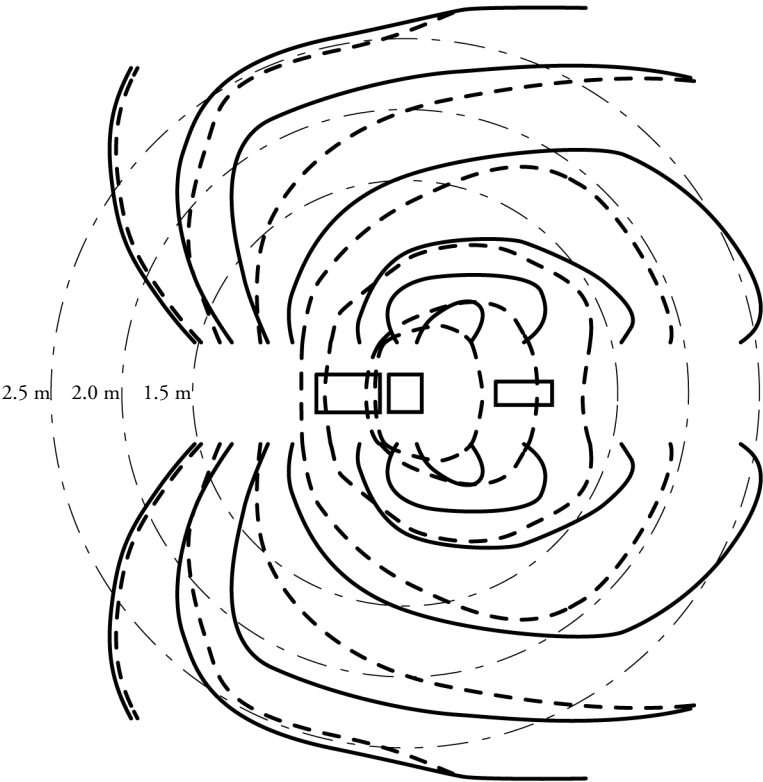


Figure 10.3 6 inch II Isokerma map (horizontal)

Lateral position

Height	
<div></div>	1.0 m
<div></div>	1.5 m
Values from outside to centre (uGy/s)/(uGym²/s)	
0.005	
0.01	
0.02	
0.04	
0.08	

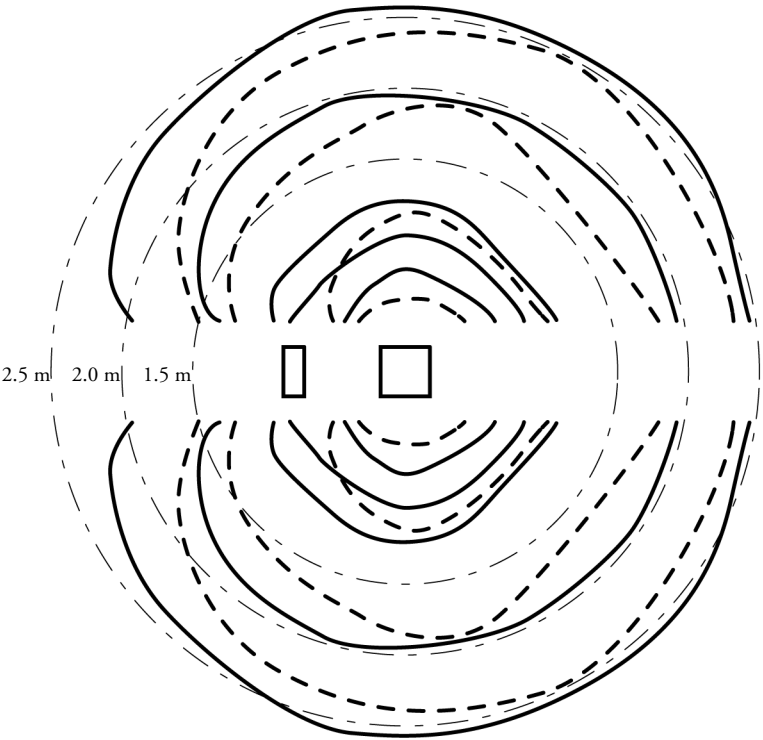


Figure 10.4 6 inch II Isokerma map (lateral)

10.4.3

Isokerma maps for BV Libra 9 inch II

Horizontal position

Height	
<div><div></div></div>	1.0 m
<div><div></div></div>	1.5 m
Values from outside to centre (uGy/s)/(uGym <sup>2</sup> /s)	
0.0025	
0.005	
0.01	
0.02	
0.04	
0.08	
0.16	

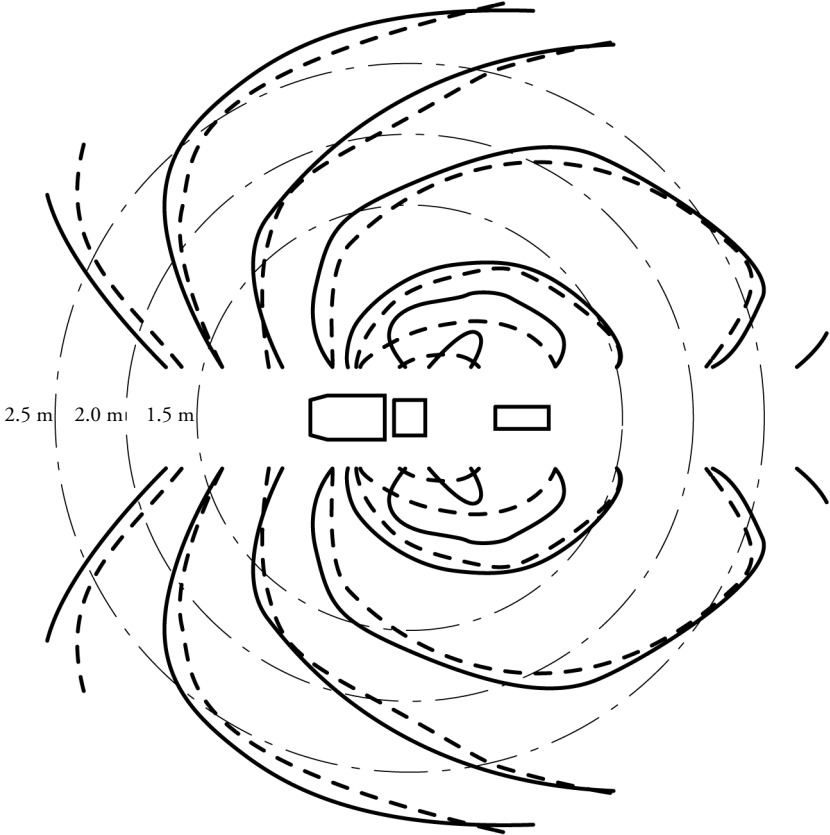


Figure 10.5 9 inch II Isokerma map (horizontal)

Lateral position

Height	
<div><div></div></div>	1.0 m
<div><div></div></div>	1.5 m
Values from outside to centre (uGy/s)/(uGym <sup>2</sup> /s)	
0.005	
0.01	
0.02	
0.04	
0.08	

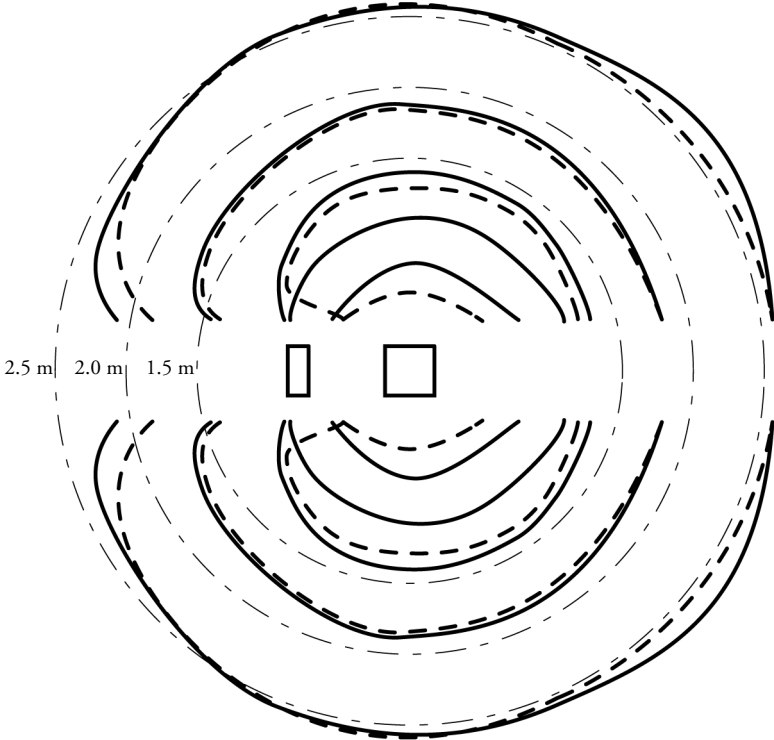


Figure 10.6 9 inch II Isokerma map (lateral)



# 11 Glossary

## 11.1 Abbreviations

Abbreviation	Explanation
ABC	Automatic Brightness Control
ACQ	Acquisition
APF	Anatomically Programmed Fluoroscopy
ASP	Automatic Shutter Positioning
CB	Contrast/Brightness
CBE	Contrast, Brightness and Edge enhancement
CCIR	Comité Consultatif International des Radio communications (International Radio Consultation Committee)
CD-R	Compact Disc Recordable
CD-RW	Compact Disc ReWritable
CE	European Communities (regulation)
CRT	Cathode Ray Tube
DFI	Digital Fluoroscopy Imaging
DICOM	Digital Imaging and Communication in Medicine
DigExp	Digital Exposure
DVD	Digital Versatile Disc
DVD-RW	DVD-ReWritable
EL	Electroluminescent
FWD (MDVDR)	Forward
HDF	High Definition Fluoroscopy
HIP	High Penetration
HIS	Hospital Information System
IEC	International Electrotechnical Commission
II	Image Intensifier
INT	Intermittent LDF
IR	Infrared
ISO	Iso watt kV-mA curve
LAT	Laser Alignment Tool
LDF	Low Dose Fluoroscopy
LCD	Liquid Crystal Display

Abbreviation	Explanation
LED	Light Emitting Diode
LIH	Last Image Hold
MDVDR	Medical DVD Recorder
MPPS	Modality Performed Procedure Step
MVS	Mobile Viewing Station
NTSC	National TV Standards Committee
PD	Progressive Display
PMMA	Polymethyl-methacrylate
Rad	Radiography
REC (MDVDR)	Record
REV	Review
REW (MDVDR)	Rewind
RIS	Radiology Information System
SC	Secondary Capture
SCH	Schedule
SCU	Storage Class User
SOP	Service Object Pair
UL	Underwriters Laboratories Inc.
VHS	Video Home System
XA	X-ray Angiographic

## 11.2 Definitions and terms

### **'ACQ' status**

The status of the acquisition patient. As long as the patient has this status, images can be acquired.

There is only one patient with this status.

### **Acquisition**

All X-ray techniques that acquire images. This can be using an image intensifier or directly on film.

### **Acquisition patient**

Current patient of which images are acquired.

### **Archiving**

Copying the screen contents of the examination monitor to paper, transparency film, video, video CD or DICOM.

### **Automatic fluoroscopy**

Fluoroscopy in which the fluoroscopy parameters are specified and set during the installation of the system and are stored as Anatomically Programmed Fluoroscopy (APF) parameters.

### **Current image**

The current image displayed on the examination monitor or the image highlighted by the square cursor in an overview display.

### **Dynamic viewing**

Viewing with the run cycle function activated.

### **Examination monitor**

This is the primary display for displaying live images, last image hold or post-processing.

### **Fluoroscopy**

Acquisition technique using continuous radiation and an image intensifier and imaging chain to produce a live image on a monitor.

The images can be simply viewed live and not stored, or they can be stored in a patient file for future reference.

### **High Definition Fluoroscopy**

Also called HDF. Used for a short period only, usually for recording to obtain the best possible images.

### **High Penetration mode**

Also called HIP. An automatic mA increase.

**Intermittent fluoroscopy**

Fluoroscopy that uses X-ray pulses instead of continuous radiation.

**Interventional reference point**

The interventional reference point is intended to be representative of the point of intersection of the X-ray beam axis and the patient. The display of dose rate and cumulative dose is valid for this distance.

The interventional reference point is 30 cm from the II entrance surface or 69.5 cm from the focal spot. (Ref. IEC 60601-2-43.)

**Isokerma**

A contour line on a scattered radiation diagram showing the boundary where a certain radiation level is exceeded.

**LIH**

Last Image Hold. The image of the last X-ray is displayed on the examination monitor.

**Low Dose Fluoroscopy**

Also called LDF. Used for C-arm (re)positioning and guiding purposes during catheterization procedures. The advantages over HDF are a reduced dose and no exposure time limitation.

**Manual fluoroscopy**

Fluoroscopy in which the fluoroscopy parameters (kV and storage speed) are set manually before acquisition commences.

**Measurement**

Determination of the angle and (relative) size of an object visible in the image.

**Overview**

Display of a 4 x 4 images matrix on the examination monitor.

**Patient file**

A file where acquired images can be stored. Each stored image obtains an identification consisting of a run and image number.

Examinations can only be stored if the memory extension option is present. The maximum number depends on the memory extension size (50, 500 or 1,000 images).

**Phantom**

An object used for calibration and verification purposes.

**Post-processing**

Performing activities to analyse images after acquisition.

**Radiography**

Direct acquisition of images on to cassette-film.

**Real pulsed fluoroscopy mode**

The real pulsed fluoroscopy mode enables the user to reduce the dose with 50%. This mode uses 12½ per second (50 Hz).

**Reference monitor**

This is the secondary display for images to use as a reference.

**‘REV’ status**

The moment the images of a patient are reviewed, it will get the ‘REV’ status. The patient will keep this status until another patient is reviewed.

There is only one patient with this status.

**Reviewing**

Looking at and post-processing images after an examination is terminated.

**Run cycle**

Dynamic review of images within one run.

**‘SCH’ status**

A patient has the ‘SCH’ status prompt after input of the patient data. The patient will retain this status until acquisition is performed.

**Static viewing**

Viewing with the run cycle function deactivated.

**Status**

There are four statuses of the patient, displayed in the ‘Patient administration’ page, namely ‘SCH’, ‘ACQ’, ‘REV’ and closed.

**Subtraction**

Display of (live) mask-subtracted fluoroscopy images.

**Viewing**

Looking at images during and/or just after the acquisition run.

**Viewing patient**

Patient of which images are viewed or post-processed etc.

**Zoom**

An optional post-processing feature to enlarge a part of the current image. Magnification factor is 2.



11.3 Legend

C-arm stand console

- A

B

1

2

3

4

5

6

7

7a

8

9a

9b

9c
- System On

C-arm stand Off

Manual kV

Information

Print image

LAT on/off

Park image

Protect image

Rotate image

Reset rotation

Scan reverse

II size - small

II size - middle

II size - large
- 10

11

12

13

14

14a

15

15a

16

16a

17

18

19

20
- X-mode - Continuous

X-mode - Real pulsed fluoro

X-mode - Intermittent

Radiography (iris and 24 cm format)

Move iris

Reset iris

Move shutter(s)

Reset shutter(s) movement

Rotate shutter(s)

Reset shutter(s) rotation

Select right shutter

Select left shutter

Reset 5 minutes fluoroscopy timer

Soft-keys

Mobile viewing station

- C

D

21

21a

21b

21c

22

23

24

25

26
- System Off

System On

Keyboard

Enter

Delete

Compose

Patient administration

Help

Post-processing

Run cycle

Overview
- 27

28

29

30

31

32

33

34

35

36
- Contrast/brightness

Invert image

Remask

Protect image/run

VCR replay

Park image

Previous/next image/run

Trackball

Undo

Accept

C-arm stand height movement

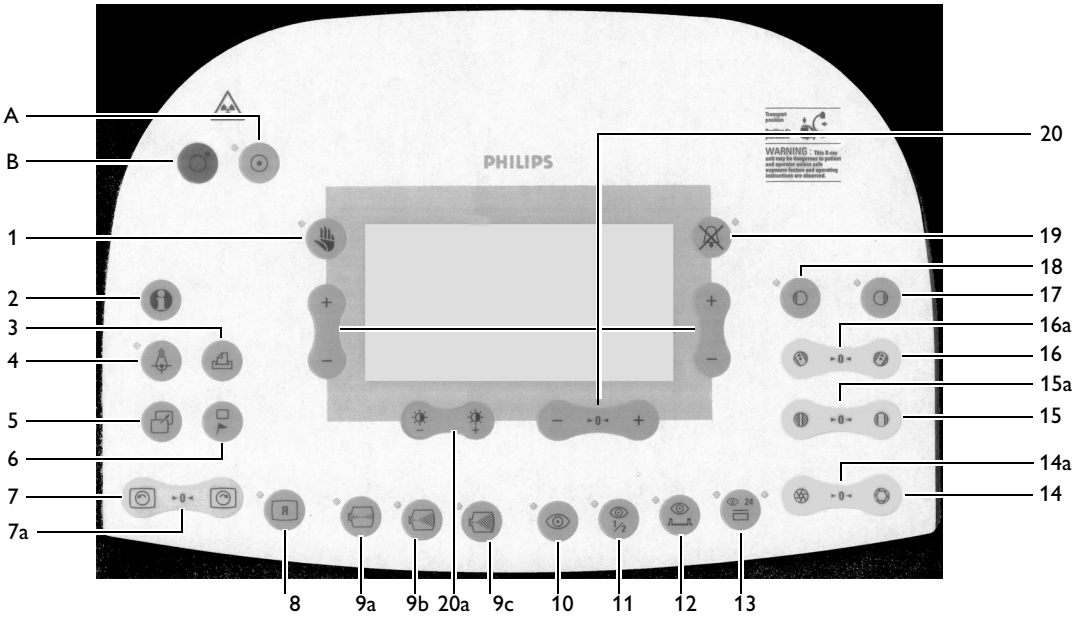
- 37
- Up
- 38
- Down

Hand Switch

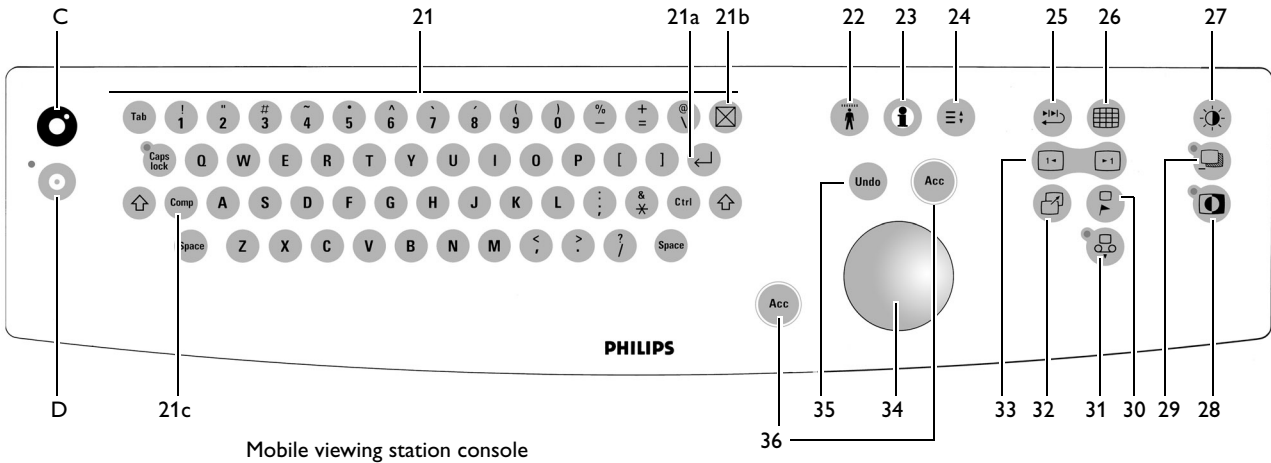
- 39
- Low Dose Fluoroscopy / Radiography
- 40
- High Definition Fluoroscopy

Foot switch

- 41
- Low Dose Fluoroscopy
- 42
- High Definition Fluoroscopy
- 43
- Mode switch



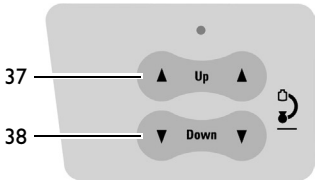
C-arm stand console



Mobile viewing station console



Hand switch

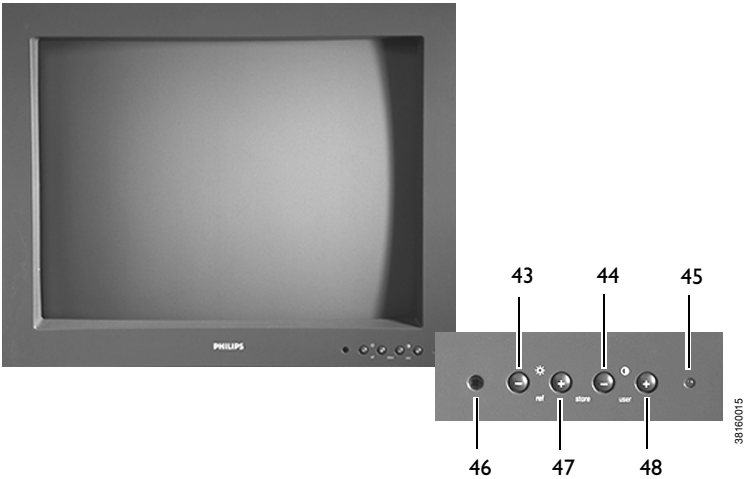


C-arm stand height adjustment



Foot switch

- Monitor**
- 43 Brightness decrease
  - 44 Contrast decrease
  - 45 - Power on/off
  - Brightness/contrast setting indicator
  - 46 ABC sensor
  - 47 Brightness increase
  - 48 Contrast increase



# 12 Index

## A

- Abbreviations *11-1*
- ABC control *4-6*
- Abdominal surgery options *1-3*
- About the BV Libra *4-1*
- About this manual *1-1*
- Accessories *9-16*
  - Detachable cassette holder *4-14*
  - Sterile covers *4-15*
- Accuracy of display *9-3*
- Acknowledgement and terms *3-1*
- Add text for hardcopy *5-77*
- Advanced DICOM package *4-10, 5-53*
- Air pressure operation & storage *9-1*
- Anaesthetic gases *2-4*
- Anamorphic optics *9-11*
- Annotation *5-70*
- Anode heat content *9-4*
- Anode heat storage capacity *9-11*
- Anode input power *9-3*
- Automatic kV/mA control *5-27*
- Automatic mA increase in LDF mode *5-27*
- Automatic shutter positioning *5-24*

## B

- Beam filter *4-1*
- BodySmart *5-27*
- Brakes
  - C-arm stand *5-4, 5-5*
- Brightness *5-21*

## C

- C-arm stand
  - C-arm stand console *4-4*
- C-arm stand geometry
  - Angulation *5-6*
  - Height movement *5-8*
  - Longitudinal movement *5-7*
  - Movements *4-3*
  - Panning movement *5-7*
  - Rotation *5-5*
- C-arm stand, configuration *4-1*
- Catheter *5-29*
- Certifiable items *9-22*
- Cleaning the BV Libra *7-6*
- Collimator *4-1*
- Compatibility of equipment with the BV Libra *1-4*

- Compliance *1-4*
- Composed characters *5-19*
- Connecting the system *5-9*
- Connector panels
  - C-arm stand *4-5*
  - Mobile viewing station *4-8*
- Continuous fluoroscopy *5-33*
- Contra-indications *1-3*
- Contrast *5-21*
- Contrast, brightness and edge enhancement *5-69*
- Contrast/brightness *3-5*
- Customization *3-1, 3-5*

## D

- Date format *3-5*
- Definitions and terms *11-3*
- Delete a complete examination *5-38*
- DFI option *9-15*
- DICOM *9-15*
  - Advanced package *4-10, 5-53*
  - Standard DICOM package *5-49*
  - Standard package *4-9*
  - Working offline *5-52*
  - Working online *5-51*
- Digital processor *9-12*
- Dimensions *9-17, 9-21*
- Disinfecting the BV Libra *7-6*
- Display matrix *9-12*
- Disposable sterile covers *5-81*
- Disposal
  - Final disposal of the BV Libra *8-2*
  - Passing the BV Libra on to another user *8-1*
- Dose area rate accuracy *9-3*
- Dose rate *9-9*
- Dose report *5-37*
  - Export *5-37*
  - Print *5-37*

## E

- Electronic shuttering *5-76*
- Emergency off *5-13*
- Emergency procedures *2-2*
- Enabling Service access *3-5*
- Entering patient and examination data *5-17*
- Environmental conditions *9-1*
- Equipotential earth connection *5-10*

Error messages 6-1  
Explosive gases 2-4  
Export panel 5-49  
Export to the hospital network 5-49

## **F**

Filtration 9-4  
Fitting sterile covers 5-80  
Flat screen LCD monitor 9-12  
Flat screen LCD monitors 4-9, 5-26  
Fluoroscopy modes 5-33  
Foot switch 4-2

## **G**

Generator 9-2  
Geometry 9-18  
Grid 9-11

## **H**

Hand switch 4-2  
Heat dissipation 9-4  
Heating and cooling curves 9-5  
Help 5-15  
    Help on the mobile viewing station 5-15  
    Information on the C-arm stand 5-15  
High Definition Fluoroscopy 5-30  
High Penetration mode 5-27  
High-end monitors 4-9  
Hospital name 3-5

## **I**

IEC 60601-1 4-9, 5-83  
IEC 60601-1-1 4-9, 5-83  
Image intensifier 9-11  
Image intensifier and camera 4-2  
Image intensifier size 5-21  
Image protection and storage 5-39  
Image review 5-35  
    Overview page  
        Indicators 5-36  
    Run cycle review 5-36  
    Run overview 5-35  
    Select image 5-35  
    View another page 5-35  
    Viewing individual images 5-36  
Images  
    Parking an image 5-40  
    Protecting an image 5-39  
    Storing an image 5-40  
Imaging essentials 5-20  
    Brightness and contrast 5-21

Image intensifier size 5-21  
Iris and shutters adjustments 5-22, 5-23  
Noise reduction 5-21  
Rotate image 5-20  
Scan reverse 5-20

Impedance 9-14  
Information 5-15  
Installing the cassette holder 5-82  
Intended use of the BV Libra 1-2  
Intermittent fluoroscopy 5-33  
Invert image 5-77  
Iris adjustments  
    during fluoroscopy 5-22  
    on Last Image Hold (LIH) 5-23  
Iris collimator 9-7

## **L**

Language 3-5  
Laser aiming device 4-13, 5-79  
Laser alignment tool 4-12, 5-78  
Laser copier 9-13  
Laser positioning tools, installing 5-78  
Last Image Hold 5-20  
LAT 4-12  
Legend 11-7  
Loading factors 9-2  
Low dose fluoroscopy 5-29

## **M**

Mains plug 9-14  
Mains voltage 9-14  
Maintenance 7-1  
Making a High Definition Fluoroscopy (HDF)  
    image 5-30  
Making a Low Dose Fluoroscopy (LDF)  
    image 5-29  
Manual kV/mA control 5-27  
Measure 5-72  
Measurement  
    Calibrate 5-72  
    Distance 5-73  
    Distance and angle 5-74  
    Two distances and angle 5-75  
Measurement basis 9-3  
Mobile telephones 2-5  
Mobile viewing station  
    Stand-alone 4-6  
Monitor display  
    images 4-7  
    other 4-7  
Monitor settings 5-25  
Monitors 4-6, 9-11  
Monitors, testing 3-4

## **N**

Neuro surgery options *1-2*

## **O**

Offline DICOM tasks *5-52*

Online DICOM tasks *5-51*

Operating temperature *9-1*

Optional equipment *4-8, 5-9, 5-83*

Options *9-15*

Advanced DICOM package *4-10*

Extended processing *4-13*

Laser positioning devices *4-12*

Medical DVD Recorder *4-11*

Memory extension *4-13*

Paper/transparency printer *4-11*

Password protection *4-10, 5-12*

Processing *4-13*

Spacer *4-14*

Standard DICOM package *4-9, 5-53*

ViewForum Surgical Workstation *4-10*

Orthopaedic surgery options *1-2*

Override manual adjustments *5-69*

Overview page *5-35*

## **P**

Paper printer head cleaning procedure *7-7*

Park *5-40*

Password protection *4-10, 5-12*

Planned maintenance programme *7-1*

Post-processing images *5-68*

Power supply *9-13*

Print and export *5-39*

Print to the hospital network *5-49*

Printer, testing *3-4*

Printing *5-41*

Auto cut *3-6*

Brightness selection *3-6*

Product disposal *8-1*

Protect images *5-39*

Protect, archive and export images

Printing *5-41*

## **Q**

Quantitative data *10-3*

## **R**

Radiography *5-34*

Real pulsed fluoroscopy *5-33*

Relative humidity operation *9-1*

Relative humidity storage *9-1*

Releasing and applying the C-arm geometry  
brakes

Angulation *5-6*

Longitudinal movement *5-7*

Panning movement *5-7*

Rotation *5-5*

Reset of fluoroscopy timer *5-29, 5-30*

Reviewing other examinations during  
acquisition *5-38*

Rotate image *5-20*

Rotation safety stop *5-6*

Run cycle *5-36*

## **S**

Safety *2-1, 5-1*

Electrical safety *2-3*

Electromagnetic compatibility *2-5*

Equipotential earthing *2-3*

Explosion safety *2-4*

Fire safety *2-4*

Important safety directions *2-1*

Labels *2-8*

Laser light radiation safety *2-7*

Mechanical safety *2-4*

Mobile telephones & similar products *2-5*

Radiation safety

Radiation guidelines *2-7*

Radiation safety & guidelines *2-6*

Symbols *2-10*

Transportation safety *2-3*

Scan reverse *5-20*

Scattered radiation *9-9, 9-10*

Select an examination for review *5-35*

Selecting a patient for acquisition *5-19*

Service access *3-5*

Shock *9-1*

Shutter adjustments

during fluoroscopy *5-22*

on Last Image Hold (LIH) *5-23*

Shutters *9-7*

Single image review *5-36*

Source skin distance (minimal) *9-17*

Spacer for minimum Source-Skin distance *5-82*

Special characters *5-19, 10-1*

Specifications *9-1*

Standard DICOM package *4-9, 5-49*

Standards and regulations *9-1*

Steering *4-6*

Sterile cloth covers *5-80*

Storage frequency *5-30*

Storage temperature *9-1*

---

- Surface temperature *9-10*
- Switching the system off *5-13*
- Switching the system on *5-11*
- System lock *4-2*
- System messages *6-1*

## **T**

- Technical data *9-1*
- Thoracic surgery options *1-3*
- Training *1-5*
- Transfer panel *5-51*
- Transport position *5-2*
- Transportation *5-2*
  - Moving the C-arm stand *5-2*
  - Moving the Mobile viewing station *5-4*
  - Parallel movement *5-3*
  - Transport position *5-3*
- Tube voltage *9-2*

## **U**

- Undo *3-2*
- Units of measurement *3-5*
- Unprotect images *5-39*
- Use of other manuals *1-5*
- User customization
  - Adding or updating a physician's name *3-3*
  - Altering the Date/Time *3-4*
  - Language, changing *3-4*
  - Set-up page *3-2*
- User routine checks programme *7-3*
  - Beep and lamp test C-arm stand *7-5*
  - Beep and lamp test mobile viewing station *7-5*
  - Iris check *7-4*
  - Laser aiming device check *7-4*
  - Laser alignment tool check *7-4*
  - X-ray control function check *7-4*

## **V**

- Vascular package *4-13*
- Vascular procedures *1-3*
- VCR *3-5*
- Vibration *9-1*
- Video invert *3-6*
- Video out *9-13*
- Video out connector *4-8*
- Video output *9-13*
- Video standards *9-11*
- ViewForum surgical workstation *5-58*
- Voltage *9-13*

## **W**

- Wall outlet sockets *9-14*
- Weight *9-17, 9-21*

## **X**

- X-ray control *5-27*
- X-ray on indicator *4-6*
- X-ray tank *4-1*
- X-ray tube *9-3*

## **Z**

- Zoom *5-71*



